PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

JUL 18 1925

The INDUSTRIAL-ARTS MAGAZINE

AUGUST
1925

THE BRUCE PUBLISHING COMPANY
MILWAUKEE - WISCONSIN

ATKINS
SILVER STEEL SAWS

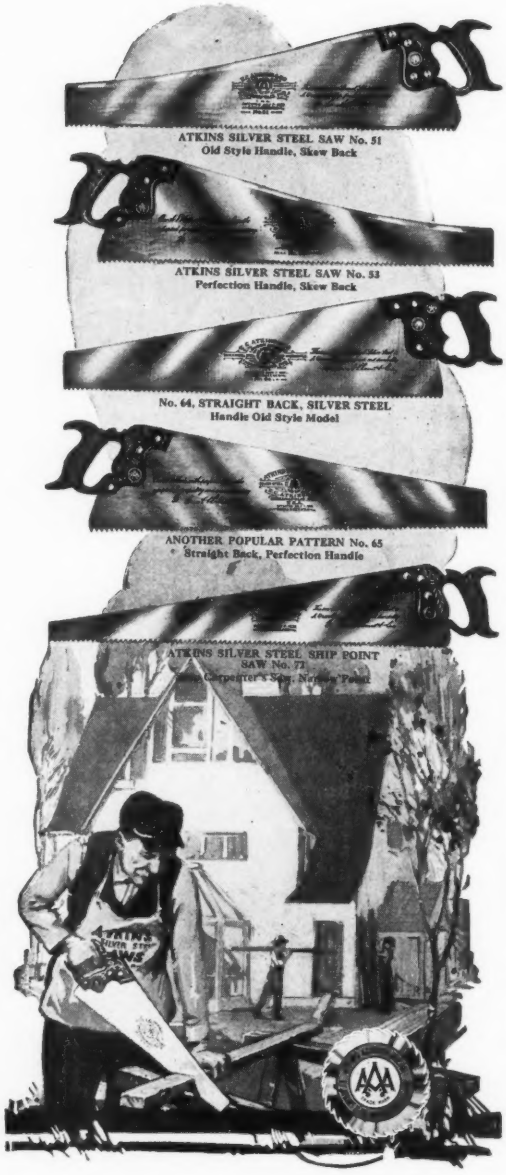
Buy these Standardized Saws for Your School

It will pay you to investigate the superiority of Atkins Silver Steel Saws. They are used in the largest Vocational Schools in the United States, which is your guarantee of satisfactory service under the most trying conditions.

Order From Your Usual Source of Supply

Insist upon being supplied with Atkins Saws, also Saw Tools, Saw Specialties, Machine Knives and Grinding Wheels. Accept no substitutes but profit by the service built into our high grade products.

Ask for copies of "Saw Sense," "How To Care For And Use Cross Cut And Hand Saws," and "Saw Fitting For Best Results." Address nearest point below.


ATKINS SILVER STEEL SAW No. 51
Old Style Handle, Skew Back
ATKINS SILVER STEEL SAW No. 53
Perfection Handle, Skew Back
No. 44, STRAIGHT BACK, SILVER STEEL
Handle Old Style Model
ANOTHER POPULAR PATTERN No. 65
Straight Back, Perfection Handle
ATKINS SILVER STEEL SHIP POINT
SAW No. 77
ATKINS SILVER STEEL SAWS
AAA

E.C. ATKINS & CO.

ESTABLISHED 1857 **THE SILVER STEEL SAW PEOPLE**

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario

Machine Knife Factory, Lancaster N.Y.

Branches Carrying Complete Stocks In The Following Cities:

Atlanta	New Orleans	San Francisco
Memphis	New York City	Seattle
Chicago	Portland, Ore.	Paris, France
Minneapolis		Vancouver, B. C.

Vol. XIV
No. 8

INDUSTRIAL-ARTS MAGAZINE

August,
1925

Incorporating: HANDICRAFT and the ARTS AND CRAFTS MAGAZINE

Published Monthly by
THE BRUCE PUBLISHING CO.
354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

NEW YORK: 30 CHURCH STREET

BOARD OF EDITORS
E. J. LAKE, *Champaign, Illinois*
S. J. VAUGHN, *Mexico, Missouri*
WM. C. BRUCE, *Managing Editor*

BUSINESS STAFF
FRANK M. BRUCE, *Publisher*
JOHN J. KRILL, *Business Manager*
F. O. DUNNING, JR., *Eastern Manager*

Cover: A Boat Builder (School 24, Buffalo, N. Y.).
Constructing Manual Arts Courses....285
C. L. Kulp
Machine Department of the Boston Trade School....286
R. E. Baker
Common Sense in Industrial Education....290
L. R. Stanfield
A Kite Making Project....291
William B. Courtney
A Semi-Factory Plan of Sheet Metal Work for Elementary Schools....293
Clark H. Morrell
Automotive Essentials....296
Ray F. Kuns
Competitive Bidding in the School Pattern Shop....300
Howard G. Olivit
Editorial....302
Wild Flower Designs—III—Design Application....305
Nettie S. Smith
Ship Model Making....305
Burl N. Osburn
The First Domestic Science School Cottage of West Virginia....306
A. T. Stanforth
Selling Vocational Agriculture to Shell Rock, Iowa....307
Margaret B. Flynn
A Garage as a Junior High Project....308
Herbert R. Troyer
Keep Tab on Shops....309
PROBLEMS AND PROJECTS:
Tapering Stock....310
W. J. Groschke
Match Safe....311
Thomas F. Googerty
The Rake for Rake Knitting as a Manual Training Project....311
Bertha Thompson
A Folding Ironing Board....312
A. V. Larson
A Suggestive Plate of Problems in True Perspective....313
V. L. Sherman
The Composition of Business Stationery Forms....314
Robert F. Salade
Oriental Den Lamp....316
Wm. M. Schaefer
A Bud Vase....316
R. L. Wilson
Objectives for the Printing Instructor....316
L. H. Dennis Becomes Deputy Superintendent....317
Dr. Struck Succeeds Mr. Dennis....317
New Books....318
Now, Are There Any Questions?....319
Industrial Arts Vocabulary....320
F. S. Crispin
News and Notes....20a
Personal News....26a
Trade Publications....29a
Trade Products....30a

Loud is the summer's busy song
The smallest breeze can find a tongue,
While insects of each tiny size
Grow teasing with their melodies,
Till noon burns with its blistering breath
Around, and day lies still as death.—CLARE.

MID-SUMMER READING

July and August are vacation months for the shop teacher, but they need not afford any interruption in the teacher's professional growth. In fact, they may well be months when he increases his teaching "stature" very rapidly by attendance at a summer school, or by some other up building activity like intensive reading.

The reading of professional literature is an efficient means of growth for the man who may be simply resting, or traveling, or working at his trade. The summer issue of the INDUSTRIAL-ARTS MAGAZINE affords rich material for such reading.

The current issue has useful articles on the Automotive Essentials, on the Machine Shop Practice, and on the Construction of Courses of Study. There are practical papers for the teachers of printing, woodwork, sheet metal, pattern making, electricity, cement work, carpentry, wood finishing, automotive work, design, etc.

Each article contains ideas and suggestions for use when the bell "rings" again.

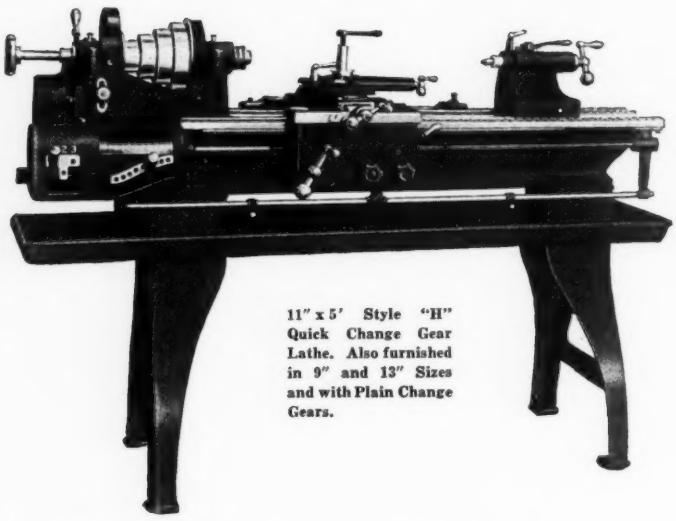
Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1925, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Jan. 16, 1917. Member Associated Business Papers and Audit Bureau of Circulation.

SUBSCRIPTION INFORMATION—Subscription price, $2.50 per year, payable in advance. Canadian and Mexican postage, 35 cents, foreign countries, 50 cents. Copies not over three months old, 30 cents; more than three months, 50 cents. Notice for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

EDITORIAL CONTRIBUTIONS—The Editors invite contributions bearing upon Industrial-Arts Education, Manual Training, Art, Domestic Science, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago.

STAR LATHES



11" x 5' Style "H" Quick Change Gear Lathe. Also furnished in 9" and 13" Sizes and with Plain Change Gears.

Essential equipment in the training of efficient mechanics

STAR LATHES are essential equipment in the training of high-grade efficient mechanics. For with STAR LATHES, there is an immediate incentive for better work and sterner application. Students, too enjoy and appreciate the opportunity to operate the type of equipment they will meet most in the industries—and STAR LATHES—Standard in Industry—are the best and most logical lathe equipment for every vocational school shop.

STAR LATHES do cost slightly more to begin with, but their real value is found in the many years of constant, accurate, trouble-free service, which is characteristic of every STAR LATHE installation, both in schools and in the trade.

Every STAR LATHE is built up to the STAR Standard, which accounts for their absolute uniformity in quality and durability.

Also manufacturers of the Short Cut and Loswing Production Lathes.

Full information and catalogs will be sent upon request.

Some Users of "STAR" Lathes

State Normal School, Oswego, N. Y.
Central High School, Akron, Ohio.
English High School, Lynn, Mass.
Chicopee High School, Chicopee, Mass.
State Trade School, Danbury, Conn.
Jacob Tome Institute, Port Deposit, Md.
The University of Rochester, Rochester, N. Y.
Shaw High School, East Cleveland, O.
St. John's University, Shanghai, China.
Waltham High School, Waltham, Mass.
Alabama Polytechnic Institute, Auburn, Ala.
The University of Queensland, Brisbane, Australia.
Pullman Free School of Manual Training, Pullman, Chicago, Ill.
Johns Hopkins University, Baltimore, Md.
Tacoma Public Schools, Tacoma, Wash.
Cornell University Medical College, New York City.

SENECA FALLS MACHINE CO.

SENECA FALLS, N. Y.

INDUSTRIAL-ARTS MAGAZINE

Volume XIV AUGUST, 1925 No. 8

Constructing Manual Arts Courses

C. L. Kulp, Director of Vocational Education, Ithaca, New York

A COURSE of study for junior high school manual arts has been completed very recently by the teachers of industrial subjects in the Ithaca public schools. The need for a new course had long been felt, but the gradual formation of a real junior high school organization hastened the preparation of courses in keeping with the present-day educational tendencies. During the school year 1924-1925 Cornell University offered a junior high school course to Ithaca teachers. A part of the assigned work was the preparation of courses of study for various subjects. The manual arts courses referred to developed as a part of the university work.

The method used in organizing a course of study was furnished by Professor R. H. Jordan of Cornell University. An outline of this method follows:

1. Study and comparison of the best texts available.
2. Study of courses obtained from other schools, cities, countries, and states.
3. Opinions of experts, from school surveys, and from books written about the subject by experts.
4. Written consultation with experts about any point concerning which there is a serious doubt (NOT the questionnaire method!)
5. Opinions of leading citizens. Not all opinions will be practicable, but some very good ones may be of use.
6. Reports of committees, national, state and local.
7. Study of industrial conditions in the local community.
8. Study of common errors in knowledge which occur quite generally.
9. Study of general periodical literature.
10. General study of economic questions and social conditions from scientific and social texts.
11. Study of actual conditions of life, the non-economic type.
12. Study of the work of the children themselves.
13. Study of child's ability to achieve the work.

In gathering material the above thirteen points were kept in mind continually. Standard texts, selected courses of known merit, various reports, opinions of experts, citizens, and children, etc., were secured and utilized. After a good supply of information gathered from the above sources was available, it became necessary to outline, tentatively and roughly at first, the course itself.

In order that our attention and efforts might be properly focused and limited to the accomplishment of the task in mind, several general aims governing the entire field of our manual arts courses were formulated, as follows:

1. To teach, through practice, those principles and processes in manual arts which will function in actual life use.
2. To familiarize the pupils with the materials and conditions existing in the major industrial fields, thus aiding them in appreciation and judgment of industrial products.
3. To assist pupils in finding what type of educational work is best adapted to their individual needs. (This is educational and NOT vocational guidance, as "guidance and direction into industry are of minor significance at this period of school life."—Bureau of Education Bulletin.)

Next in order came a statement of the way in which the above general aims are to be achieved, through a number of specialized activities carried on in the school shops and unspecialized activities performed in the home. All projects are to be those things in which the boys have an immediate interest. A great deal of freedom of choice will, it is hoped, insure immediate interest.

Several of the purely mechanical features of the new courses had to be decided upon at this point before further progress in course construction could be made. The first of these was the question of the time each course could be allotted, which in large measure determined the length of each course. Ninety minutes of shop work and 45 minutes of mechanical drawing per week in the seventh and eighth grades were decided upon as the maximum under present conditions. For the ninth year, three shop periods of ninety minutes each and two mechanical drawing periods of ninety minutes were agreed upon.

For purposes of uniformity a topical outline was drawn up to be followed in making out all courses, as follows:

1. Specific Aims.
2. Activities or Processes.
3. School Projects.
4. Classroom Talks and Discussions upon Related Materials.
5. Field Trips.
6. What a Pupil Completing the Course Should Know and be able to do (minimum essentials).

In a recent bulletin of the U. S. Bureau of Education, appears the statement, "No part of the making of a course of study is more important than a clear statement of aims or objectives. Indeed, I can conceive of an effective course of study made up wholly of objectives." While the great importance of adequate and attainable aims is recognized, it is also realized that one of the greatest errors of curriculum construction in the

past has been the tendency to make courses containing only aims and subject matter. Activities and processes are of major importance in any course which is to contain assured value even in the smallest units of the work taught. If a course is to furnish explicit values and subordinate values, each item must be evaluated in terms of objectives or aims. In present day curricula "use" is emphasized in the preparation of all courses, preferably immediate use, with possible deferred values. To aid in giving life values to our courses we endeavored to determine content by a study of duties, and to give emphasis to problems in which errors are frequent.

Field trips are to form a definite part of each course, with a specified time for each trip. These trips will, in a measure, make effective our second general aim, "to familiarize pupils with the materials and conditions existing in the major industrial fields." The pupil will be taken from his school life, and for a few minutes or possibly hours, brought into contact with the reality of the work of real adult life. "We cannot fully appreciate the viewpoint of the worker in any walk of life until we ourselves are put in his place."

Subject matter for the courses to be taught has been largely taken from carefully prepared trade analyses made by the instructors in the manual arts field enrolled in extension courses in New York State normal schools. Although a large part of our courses are deprived from parts of these analyses, the material which we have selected is necessarily of an elemental nature and only a small part of each complete trade analysis. The needs and abilities of our pupils in manual arts are met by some of the more elementary units referred to.

The selection of subject matter was facilitated by a report in questionnaire form made by many of Ithaca's most representative citizens. This questionnaire consisted of a number of unspecialized activities, listed properly for checking purposes. Those replying indicated by means of a check or by underscoring, those activities which they felt to be of value when measured by actual life use. Together with many of the replies were comments from those answering, which gave many interesting suggestions and evinced a rather unusual interest in the work outlined.

A second source of subject matter developed through study of courses obtained from federal, state and city departments of education. Chapters on manual arts in several junior high school texts of recent publication gave further assistance.

Supplementing the above sources of information were questionnaires filled out during school hours by all boys enrolled in manual arts courses, approximately 300 seventh and eighth grade boys. These questionnaires gave an opportunity for each boy to show what his interests were outside of school hours, together with a chance to list the names of projects which he would build in the school shops or at home, if given an opportunity to do so with good instruction.

All projects listed in the various courses are simply suggestive of what may be done. Any work of equal value and appeal to the pupil may be substituted by the instructor.

In addition to the individual projects to be constructed by the pupils, at least one communal or quantity production project will be carried out each term, in each course which lends itself readily to the production type of work. This project may be a very simple one and still serve its educational purpose, namely, that of developing the social spirit of the group through cooperative effort and relationship, and of illustrating the method of production most commonly found in modern industry.

The general or "composite" shop, as such, will not be made use of in Ithaca, as it is felt that our present organization of specialized shops will bring better results. Two kinds of work may be taught in the same room or shop, but not at the same time.

Machine Department of the Boston Trade School

R. E. Baker, Head of Department

THE machine department, in common with the policy of the other departments of the school, endeavors to teach: First, the fundamental processes of the machinist trade; second, the related subjects which will make for a more intelligent appreciation of the trade, and stimulate interest in the higher opportunities for first class workmanship and for executive positions; and third, the so-called general, or academic subjects.

This article will deal primarily with the first of these objects. The writer does not consider that the first named is the first in importance. Because of the nature of the "trade" school the studies are based largely upon the "trade," and the time allotted to actual trade processes is fifty per cent of the school work. The trade processes are analyzed into shop projects and laid out in courses for first, second, third, and fourth-year shop units, which will best adapt them to our shop equipment, our finished product, and follow closely good principles of teaching.

Around this outline for shop work are built up the courses in related subjects, drawing, mathematics, shop processes, and to a large extent the sciences. Correlation is the key word in developing and teaching these subjects.

The shop plant consists of two well-lighted and ventilated shops, each 50 ft. long and 60 ft. wide, a tool room and crib, (30 ft. by 30 ft.), a room for storage of special tools and small stock, and offices for the instructors. In shop No. 1 the equipment consists of thirteen engine lathes, one semi-automatic screw machine, three universal milling machines, one vertical milling machine, one upright drill press, one sensitive drill, two planers, two shapers, one plain and one universal grinder, arbor presses, grinder stands, and ample bench room with vises and bench equipment.

Shop No. 2 has 22 engine lathes, two speed lathes, one plain and one universal milling machine, two shapers, one planer, two upright drill presses, one sensitive drill, one centering machine, arbor presses, grinder stands, and bench room and equipment. The tool room is equipped with a 14" tool room lathe (with taper, draw-in collet, and relieving attachments), a shaper, universal milling machine, universal grinder, surface grinder, tool and cutter grinder, sensitive drill, and bench equipment. The heat-treating equipment, located next to the tool room, consists of a triple furnace (forge, furnace, and lead pot), oil and water quenching tanks, an anvil, and a bench with heavy duty vise.

The tool crib has a full equipment of the ordinary shop tools which are drawn out on the check system. One feature of our tool equipment, which must of necessity be somewhat different from the commercial shop, is the machine sets of tools. One example, the lathe set, will give the idea used for lathes, planers, shapers, milling machines, and drill presses. In strongly built boxes, spaced and hollowed out to hold the different tools, so they can be readily inspected, are a No. 1 Armstrong straight tool holder and wrench, a 6″-scale, 4″-outside calipers, 4″-inside calipers, and a center gage. Similarly, in the boxes for other machines, are sets of tools used on ordinary jobs upon that particular machine. There is one box for each machine in the shop. One check permits a workman to obtain

A VIEW IN ONE OF THE MACHINE SHOPS AT THE BOSTON TRADE SCHOOL.

the box for a machine. This method has proved efficient both from the tool-keeper's and the workman's point of view.

The reader must bear in mind that our equipment is used by three distinct groups in a day: two day classes and one evening-school class. General tools, such as mandrels, drills, taps, dies, etc., are given out on check. Each shop division has an especially formed check (round, oval, octagon, etc.), which makes it a simpler matter to keep track of tools drawn out. The special tools, such as special gauges, jigs, fixtures, special boring bars, special precision tools, etc., are kept in a separate room, and are checked out by the instructor in charge of this equipment.

Our shop work is carried along on the "production" basis. The finished product is for our own school shops or science laboratories, for other school or departments in the Boston system, or for outside commercial firms. Having moved into a new and much larger building but a few years ago, we have been kept reasonably busy upon the equipment needs of the different shops. Our largest jobs have been four wood turning lathes, six sensitive drill presses, six grinder stands, two 8″ bench lathes, sixty 4½″, and seventy-five 3½″ machinists' vises.

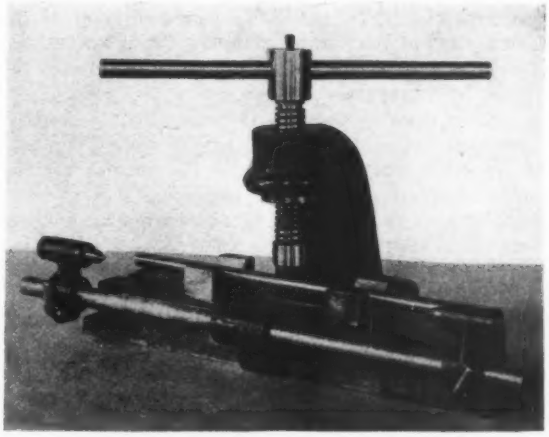
Work for other departments requiring metal parts and machine work, such as wood-working department trucks and clamping horses, electric department ladders and motor testing pulleys, sheet-metal department bench tops, punches and dies, drawing room and lunch room tables, and various laboratory testing apparatus, has supplied us with very practical and interesting projects.

To make additions to our own tool equipment, and to maintain the ordinary upkeep of our machine tools on such work as mandrels, machine and hand reamers, counterbores, milling machine arbors, chuck face plates, planer fences, V blocks, angle irons, etc., we have been able to keep many of our third and fourth-year boys busy upon advanced work.

We are very fortunate in having the cooperation of outside commercial firms, and fully sixty per cent of our work has been upon outside products. Manufacturers supply us with their castings, bar stock, and other materials, and working to their blue prints and specifications, we machine and send back to them the product ready for the market. This branch of our work is one of the most important and interesting, for we must do finished work which meets commercial standards, and the parts must be interchangeable with those made by the several firms. Special tools, jigs, and fixtures must be designed and made to insure precision and efficient shop production.

Chief among these products are pipe vises, auto washers, special pipe wrenches, shaper guards, and lathe back rests. These jobs are furnished to us in lots of 50 or 100, thus insuring enough work upon a "production" basis, and to give enough of a project to a boy to make him fairly proficient.

Our teaching force in the shop consists of three instructors and the head of the department. Assisting them is an apprentice helper and the tool-keeper. Each instructor is in charge of a shop. (The tool room, tool crib, heat-treating equipment, and a few machines in shop No. 2 are considered and run as shop No. 3.) An instructor is in constant attendance in his shop and has charge of the assignment of machines, assignment and inspection of jobs, and the thorough instruction of each boy. Frequent group demonstrations are given, but individual instruction at the machine or bench is employed mostly.



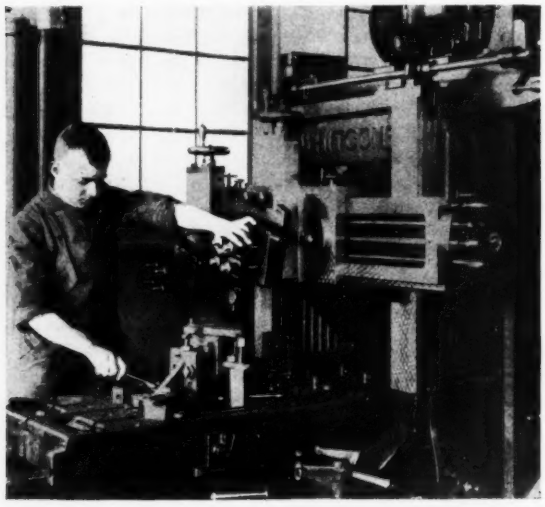
ONE OF THE DEPARTMENT PRODUCTS AT THE BOSTON TRADE SCHOOL.

The shop course is laid out by machine operations in yearly units. It is difficult to determine the most efficient order of operations to follow; it is difficult to follow closely such a course when it is determined upon, but an attempt is made to have the class follow the operations as listed, in sequence.

Of necessity, where there is a variety of types of machines and jobs, every boy cannot be working upon the same processes, but during his class term he will

have covered the regularly outlined course. Having more lathes than other machine tools, and ample bench tools and vises, these two phases of the work generally receive the first attention, but in the case of boys who have had some previous shop experience, as prevocational students, we feel free to start them upon one of the other machines used in the first year.

The shop course was outlined in the following manner: A questionnaire was submitted to each shop instructor, asking him to list the several processes on



A TYPICAL PLANER JOB AT THE BOSTON TRADE SCHOOL.

each type of machine tool, and in bench and tool work, which would ordinarily be required of a workman in the trade, having in mind, particularly, our shop equipment, and the kind of work which we would probably have to do. Having listed each machine by general operations, the next request was for a division of the operations into year units, grouping the machines and operations on machines, which would ordinarily be covered by a first-year boy, second-year boy, etc.

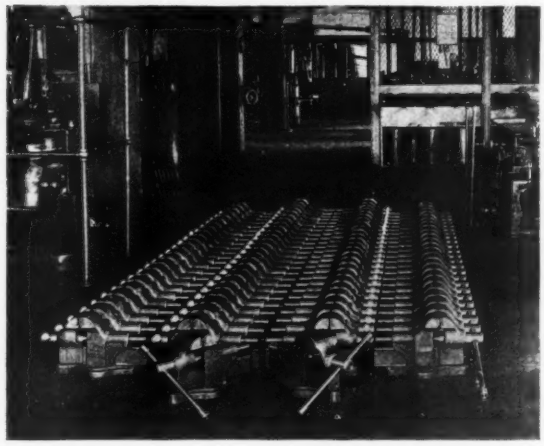
After these questionnaires were filled in, conferences were held at which each man discussed his particular order and grouping, and the reasons for his choice of order. From these discussions a course was mapped out which seems to fit our particular problem best. In some minor details, changes have since been made, but in the main each class follows the program as outlined.

But in this case also the course may not be closely adhered to by each one in the class. A boy's ability very often determines his assignment of work. Although the planer is not listed in the first-year group of operations, a boy of right ability, having satisfactorily finished his regular work, may be given simple work upon the planer. A well qualified boy may be put on as a helper with an upper class boy, on advanced work. The converse is equally true. Although each student, to satisfactorily complete his course, must be given some work involving the processes listed on each machine, it is obvious to every reader that there are certain jobs, especially in simple tool making, which would be reserved for the boy of exceptional ability. In the fourth-year group there are always some boys who have good mechanical ability and some degree of executive ability. Such boys may very profitably be appointed as "straw bosses," or to work upon some "inspection" work.

Shop work, especially in the upper classes, must be assigned largely upon a personal merit basis. In the first and second year, where boys are working upon "production" jobs, each boy can be given the same relative amount and kind of work.

Classes at the trade school are conducted upon the "fifty-fifty" basis; one-half of the student's day is spent in the shop and the other half in related and academic classroom work. Necessarily we must have a morning and an afternoon group using the same machine equipment. For this reason work must be mapped out, so that a project or job is carried on without interruption, if possible. A lathe chucking and boring job started by A in the morning may be finished by B in the afternoon. An instructor so plans his work, however, that B has already had some setting up and roughing work upon this or a similar job. The next morning A may finish a job similar to the one started by him the previous day.

C may be roughing out ten vise screws and complete but three of them in the morning. D works upon the same lathe in the afternoon, and carries the job along, but he has his own ten bars of stock to work upon and is held accountable for them. This system does not appeal to us as the correct or regular "shop" method. From the school administration point of view, however, it is considered the best, and our shop courses are laid out, our programs arranged, and work assigned to insure as little interruption as possible. Here again



A PRODUCTION JOB AT THE BOSTON TRADE SCHOOL.

the educational idea is kept in mind, and lessons are taught by recurring set-ups, and machine line-up tests.

How is the shop work assigned? We endeavor to have in mind at the beginning of each school year, enough work and of such a variety, which we can reasonably expect to complete and deliver by the following summer. This is especially important in taking in outside jobs. Work must be chosen which will furnish steady work and the proper trade training on the basis of approximately sixty first-year, thirty second-year, eighteen third-year, and twelve fourth-year boys.

At the beginning of the school year cleaning up the machines and tools, checking up stock and tools received during the summer, and breaking in new boys requires time, enough for the instructors to size up the work in general; "carry over" jobs to be continued and com-

pleted, and new jobs to be started. Conferences are called during the first week, at which the drawing instructor sits in, and work is discussed from the following viewpoints: What drawings and blue prints will be needed, and when? What new tools, both general and special, will be required? What methods are we going to employ to carry on the several jobs, and what processes can we start our four classes on to fit our shop course and keep our machines running on maximum efficiency?

In other words we outline our general policies, get every boy started as soon as is practicable, and leave to subsequent weekly conferences the more detailed routing of each job. At these weekly conferences, the work discussed in general is checked up, and individual assignments made to each shop instructor. When will the job assigned to Shop No. 1 require the special tools to be made in Shop No. 3? How many of a 100 lot of vise bases can be planed in Shop No 1; how many in Shop No. 2? Will Shop No. 1 or Shop No. 2 handle all of the bench screws, and all of the chucking and boring on the auto washers, or will each job be split up, and in what proportions? These and similar questions are discussed and assignments are made upon the basis of these conferences. Each instructor is responsible not only for keeping his machines and workmen busy, but he must furnish them with work of a progressive and prescribed nature.

A very pertinent question might be asked here: "Do you run a job through as it would be put through in an industrial plant?" The answer is "yes" and "no." A few examples will explain our position. First, we are running a trade school shop: our equipment though extensive and of the best is limited in its types, sizes, and power; our workmen are all "apprentices," and we must keep in mind all the time that we are teaching the fundamentals of the trade. We are endeavoring to inculcate habits of accuracy, skill, and finished workmanship, and to stimulate interest in the "why" as well as in the "how" of the trade.

We may, and often do employ methods which would not be employed in a commercial plant. Take, for example, the turning and threading of 100 vise screws. The screws are 16″ long over all, have a shoulder end 3″ long and 2″ in diameter. Upon the other part is cut a 1⅜″x4″ square thread 10″ long. A first-year boy may work to a blue print where threads are not shown at all and where the part to be threaded is 1⅜″ + .010″. He roughly turns ten bars off stock, then finish turns them. They are then routed to the third-year group where a boy grinds fifteen or twenty to within .001″, then finish grinds to 1⅜″ standard. They are then routed to the second-year group where several boys will rough and then finish thread the lot. Some years the whole lot of 100 may be ground, and other years only one-half or one-fourth of them will be so machined.

If we have been fortunate in securing grinding work of such a nature and in such quantity as to give proper instruction to our classes as outlined, so much the better; if not, we adopt some such system. In either event we make it plain to the worker on the job and to our classes in shop processes, that we are using the stock to teach them standard operations. Then we explain one or more standard methods adopted outside.

Not having boring mills in our equipment, much of our boring is done upon the lathe, drill press, and milling machine. Lacking a slotter, our slotting of large cored holes is done on a shaper. Our gears of all types are cut on a universal milling machine, although in classroom we discuss in a general way the automatic gear cutter, the gear shaper, and the gear hobbing machine. In this classroom discussion we make use of reference books and catalogs, have boys look up various methods and machines employed, and report to the class their findings. Many of the boys secure summer employment in shops, and their experiences are helpful.

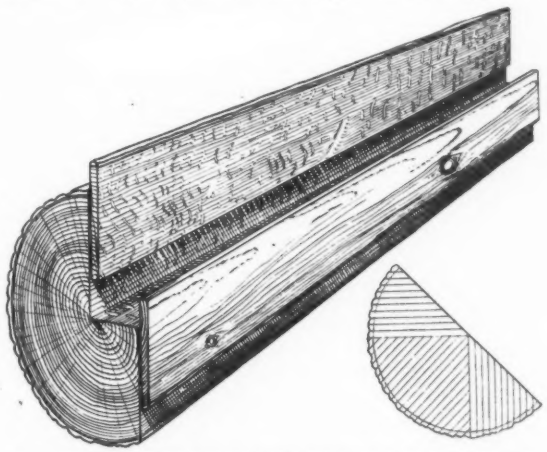
During the third and fourth years, trips are conducted through some of the large industrial plants, and these afford splendid opportunities to check up on our methods and on large "production" methods.

During the four years of shop work the boys are studying closely related work in the classroom. In every job or project we strive to arouse the "think" in a boy's make-up; we show him we must develop above the shoulders as well as below.

Do we teach the boys the trade? By no means. We give them what we consider a first-class start, and with the continued and steady application of this start in a commercial shop, we believe a boy is better fitted to become a first-class tradesman, and in a shorter time, than by the ordinary shop methods.

You will often hear this or a similar statement from a shop foreman. "Yes, but when we get a boy from a trade school he must first unlearn a lot of what he has been taught." Something is wrong somewhere, and we believe that the "somewhere" is frequently with the foreman. We do know that readjustments of methods must be made, as readjustments must be made by workmen going from one shop to another. In common with other students graduating from school, our boys have, or think they have, a lot of power stored up. Let them turn it all on at once, as is boy fashion, and they will generally "blow a fuse," but an intelligent foreman will try to teach a method for the gradual "throwing on" of the power, to the mutual benefit of both parties.

Our instructors, who are all men of years of shop experience, try to impress it upon the boys that they have only had a glimpse of the trade, that they will have months and months of repetition work, that they will have to increase their speed and skill, that they will have to take orders, and obey them promptly and willingly. One of our parting words to each graduate is G-R-O-W. (Interpreted: Go right on working).



A QUARTER-SAWED BOARD (ABOVE) AND A PLANE-SAWED BOARD (BELOW) CUT FROM AN OAK LOG.
Diagram by the Forest Products Laboratory, U. S. Forest Service, Madison, Wis.

Common Sense in Industrial Education

L. R. Stanfield, Director Mechanic Arts, North Dakota State Normal and Industrial School

THERE are evidences on every hand to show that the manual work in our schools is losing ground instead of measuring up to the opportunities rightfully belonging to this important phase of school training. Instead of assuming the position in the curriculum so freely predicted a few years ago and toward which it was so rapidly moving, it seemingly reached its highest peak far short of a commanding position and is now receding.

We are face to face with a reality and not a mere possibility or even a probability. It is urgent that the leaders in the manual movement again get together, find the cause and adopt a suitable remedy. May we not assume from the fact that as long as the leaders in the movement were united upon a common purpose and similar methods, and the progress was marked and the manual work in our schools rapidly being accepted as necessary and desirable for all the pupils in all our schools, that the fundamental cause of the conditions existing today is due to the lack of unity in our own ranks? Is it not reasonable to hold our leaders of the present day largely responsible for the present state of affairs in the manual education field?

If the leaders in mathematics, science, history and the other subjects accepted as necessary and satisfactory for a school curriculum, were constantly throwing confusion and discouragement in the ranks of the teachers of these subjects, by offering at each professional meeting and publishing in their journals scathing criticisms of the methods followed in the past, or confusing and discouraging by constantly offering new subject matter and new divisions, with the strong inference that what had been offered in the past was at least of questionable value, it would not be long until we could reasonably predict that these time-tried subjects would be much in disfavor because of the confusion in the minds of the general public as to values represented.

Carrying our simile further, mathematics at no distant time, was just as formal as the old Russian system and, within the time of every shop teacher, the practical results of the classroom work in simple arithmetic has been productive of so little result in real ability that the students as well as the shop teacher, find it quite embarrassing when the training is called upon to function in real problems. Yet we do not find the mathematical brethren each decade or less seeking a new name by which to designate their part of the school curriculum. Neither do we find them breaking up the autonomy of the subject by offering in the ordinary classroom, arithmetic for the baker, arithmetic for the butcher, and then maintaining a cynical smile because it is apparent that the job of candle-stick maker has largely passed out of existence. It is true some of our own critical coworkers have insisted that the mathematics offered in school should be, addition for the cement worker, subtraction for the butcher, multiplication for the farmer, and division for the baker, but outside of their own immediate following they have never been taken seriously and we find our mathematics still being offered as addition, subtraction, multiplication and division, the fundamentals upon which are based all the rest of the mathematical work. If our geography friends made a genuine attempt to teach all the geography that the salesmanship organization even our medium-sized distributing agencies feel essential for their manager to know, instead of confining themselves to a very general insight on the part of the pupils, to the climate, products, topography, and distances, we would soon find geography relegated to a very uncertain place in the school requirements again because of the confusion and doubts in the minds of the pupils and their parents. "Science of the Common Things" is very unlikely the old-time science courses offered largely without laboratory equipment of any type; still we find the fundamental facts of science being laid through the use of very formalized experiments and it is only when the work is carried into the advanced years of a college course if ever, before students are supposed to undertake the solution of original problems or to fit the problems to the individual needs of the pupils.

We might continue on down through the list of the subjects that have stood their ground until today they are accepted by the public as necessary parts of every child's preparation for real life, but each illustration would go to show these subjects have failed to do the things that the leaders have done with manual training. Why can we not all see the folly of making so many complete and radical changes from the fundamentals that have given the subject a strong hold in the past? Let the teachers of the industrial arts get together upon a basis that will be within the possibilities of all teachers of the manual work, and stick to these fundamentals as necessary and sufficient and not continue each one to scour the country about to discover something new to propose. So many suggestions conceded they are all good, simply tend to confuse and the stabilizing influence so badly needed is wholly lacking.

A standard course in woodwork with problems, or projects, carefully worked out by experts and presented in such a way that the fundamentals of industry would be understood, even if formalized would do for industrial arts what the texts in physics and chemistry have done for science. If a course in metal should be worked out so it could be taught in the cities as well as in the smaller schools that could afford only a modest equipment, it would act as a stabilizing influence. The effect upon the public exerted by the united efforts of these teachers in cities and towns working together would far overshadow, or overreach the results of the present disorganized series of courses now offered, no matter how well they may seem to fit the needs of the individual or the community.

It is reasonable to believe the leaders in this manual movement can get together and formulate such courses if they would quit shying at the thought some one might slightly be deprived of the opportunity to do as he thought best under all circumstances. They have largely assumed the attitude there are no common grounds upon which preparation for industry can even make a start. It would be far better to risk formalizing of a course by those capable of making reasonable variations than it is to trust these same persons without adequate details for handling the industrial work. The industrial work in most communities has been rated far below par largely because we have trusted these people too much.

It has generally been conceded that the manual field is divided into two separate and distinct parts. The vocational leaders recognize that their work should

not begin before the end of the junior high school period and even the senior high school can offer technical courses whose outlets are other than in the field of productive labor. The industrial arts leaders have generally agreed upon some seven objectives that are entirely adequate and satisfactory, not only to the industrial teachers themselves, but also to the patrons and general public as well. It now remains for the leaders to realize the seriousness of the present situation and the probable cause, and to determine upon their part to get together and agree upon suitable courses even at the risk of formalizing the work thus failing to completely fit the course to every community. Then at least, we can present a solid front as do the other departments in our public schools. The allied armies in the late World War would never have been victorious had each race represented, insisted on trying out methods until one best suited to its individual needs had been found, regardless of what the others were doing or going to do. Less likelihood than ever if each major and captain, let alone the second lieutenants, had insisted upon trying his hands at devising general plans and special maneuvers he felt best fitted his own plans or individual unit. For the sake of the greatest good to the greatest number, we must submerge our desires for too much individuality, and be willing to accept the leadership of those who can and will lead, because of the greater benefits to be derived from united action toward a common cause. The industrial arts people need a Moses but in modern time, unanimity of effort is best assured by a small group working together with the determination to agree, and the rest equally determined to accept their leadership. We need detailed plans and courses carefully worked out, agreed upon, and intensely presented with the one view of united effort to establish this industrial work as a necessary part of every school curriculum. After its complete establishment, there will be plenty of time for conservative improvement.

A Kite Making Project

William B. Courtney, Director of Manual Training, Hackensack, N. J.

The kite making project described in the following paragraphs under the formal heads of aims, materials, subject matter, and suggestions, has been successfully used as a unit of study in the fifth and sixth grades of the Hackensack schools. The classes met for ninety minute periods per week.

General Aims. To provide for the general growth or development of the children by giving them common experiences to meet common needs.

To supply information or knowledge regarding industrial life and establish right attitudes toward industry and the industrial worker.

To stimulate appreciation of how man has converted raw materials into finished products and developed natural forces to supply his needs.

To develop a thinking individual with ability to plan a project, execute his plan and judge the result.

Teacher's immediate aim. To satisfy natural curiosity of the pupils by providing ample opportunity for experimentation with materials and simple construction.

To arouse the interest of the pupils in the study of wind as a natural force.

To encourage the pupils to make some project that will work with the wind.

Pupils' Aim. To make a kite, windmill, weathervane, glider, airplane, balloon, parachute, sailboat or some other project which will "go" with the wind.

To participate in a contest or tournament.

Illustrative Material. Newspaper clippings, weather charts, government reports, models of the various projects suggested, photographs, charts, reference material, visitations, etc.

Subject Matter:

I. **Wind**
   1. Causes
   2. Variations
   3. Effect on weather

II. **U. S. Weather Bureau**
   1. Stations or observatories
   2. Instruments
   3. How predictions are made
      a. Why not always correct
   4. Value
      a. To farmers
      b. To seagoing occupations
      c. To all people
   5. Barometer

III. **What air is**
   1. Characteristics
   2. Density—effects
   3. Vacuum
   4. Storms—Cyclones
   5. Gravity

IV. **How we use the wind**
   1. Sailing vessels—use—history
   2. Wind mills—use—development
   3. Transportation
      a. Airplanes
         1. Why plane stays up
         2. History and development
         3. Advantages and disadvantages
         4. Types
      b. Dirigibles
         1. Size and shape
         2. Advantages
      c. Balloons
   4. Kites for observation
      1. Construction
      2. Photography
      3. Why they fly
      4. Materials used
   5. Gliders

Suggestions for Kites and Kite Tournaments

These suggestions will be devoted to the development of kites and kite tournament. A similar project could be made using gliders or airplanes.

A. To successfully fly, a kite must be:
   a. Properly balanced in construction and shape
   b. Properly tilted toward the breeze
   c. Keels, tails or other means of balance, sufficient to give poise

B. Frame.
   a. Light and tough
   b. Materials
      Aluminum tubing, spruce, yellow pine, balsam, basswood, bamboo, white cedar

C. Covering—not too flimsy. Some stiffness is required.
   a. Tissue paper, newspaper, lining, cambric, silk

D. String
   a. Twice as strong as the kite pulls
   b. Seine twine—braided line

A FEW OF THE NOVELTIES MADE BY THE BOYS.

Tournament

This feature is very important primarily because it offers an incentive for the making of kites and secondarily because it offers a means of publicity for the department that can not be underestimated. Opportunity should be given to the pupils to participate in the organizing and arrangement of the tournament; challenges may be sent to other schools or communities. Entry blanks can well be printed in the school print shop. Some public-spirited citizen may offer prizes or the school could furnish badges, ribbons, or possibly a banner.

ON THE WAY TO THE FLYING FIELD.

The classes may be arranged as follows: (1) The most picturesque kite; (2) the strongest pulling kite; (3) the highest flying kite; (4) the speediest kite or the kite to attain a certain altitude in a given time.

The contest should be arranged for the spring, and publicity given in the local papers.

Correlation. Situations will arise in the discussions on subject matter wherein splendid opportunity is given to tie up the material with work in general science, geography, English, drawing, spelling and arithmetic.

Suggested Method of Approach and Procedure

If the situation does not arise wherein reference can be made to the wind, then it should be created by the instructor by asking suggestive questions. Full preparation must have been made before the situation is created so that the lesson may proceed as smoothly as possible. Arouse the pupils' interest to the fullest and when they are bubbling over with enthusiasm a suggested list of projects may be developed with the class and written on the blackboard. From this list the class is allowed to make their individual selection. Groups may be arranged if several types are chosen; these groups may choose to elect a foreman who will in a measure be responsible for the rest of the group. After the class has organized and selected its project, attention should be directed to the illustrative material, with the intention of bringing to the pupils' minds the desirability of having some means of conveying this idea to the group or the instructor. This will naturally lead to a situation where the instructor can develop the idea that a drawing would be a convenient method of conveying that idea.

A simple drawing should be developed with the class so that the pupils can convey the size, shape and material of the project they are planning to construct. Any working drawing or sketch that will convey the idea should be acceptable. No attempt should be made to secure a technically correct drawing and no great amount of time should be spent on making the drawing.

The instructor should have frequent consultations with individuals or groups, in which

READY FOR THE CONTEST.

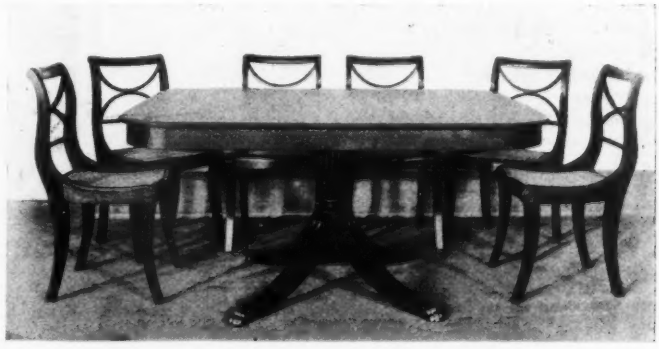
he offers advice and suggestions regarding construction and arrangement. However, liberal opportunities should be given for originality and initiative in design. If the pupils have some definite ideas, by all means permit them to experiment with them. Some will undoubtedly make mistakes. Yet will he not learn something through his mistakes? Permit the class to do some thinking and planning. The teacher is to help and suggest ideas and to encourage the boy in his thinking; not to dictate every move he is to make. When necessary, call the attention of the class to mistakes or other things to avoid. Skill and technique should not be neglected, yet it need not be emphasized at the expense of the other values to the pupil.

Develop the informational side or discussion as the need arises. At the same time do not kill the pupil's interest by spending the class period in a dry discussion or lecture. Make it snappy, be enthusiastic about kites, read up on the material to present, make a kite if necessary and fly one. In other words, the teacher is dealing with youngsters, not kites. After all, we are developing children, not kites, airplanes, carpenters or mechanics.

Some will wish to decorate their kites, thus providing opportunity to bring in some applied design. Others will not care to decorate. If so, do not insist.

Conclusion. This project will afford considerable latitude for development on the part of the pupils.

Freedom is allowed but not license. The children will be happy and enthusiastic. At the same time they will be getting new experiences, forming habits of inestimable value to them later in planning, executing and judging their own efforts. Considerable information will be "put over" that will add to their general education, and last but not least, the instructor will have an opportunity to get out of the rut and try something perhaps not in the course of study.



DINING ROOM SUITE MADE BY STUDENTS IN THE RAMON DE BALDIOTORY TECHNICAL SCHOOL, SAN JUAN.

A Semi-Factory of Plan Sheet Metal Work for Elementary Schools

Clark H. Morrell, Instructor of Metal Work, State Normal School, Fitchburg, Mass.

Sheet metal work as a school activity has not progressed in proportion to its high educational value. A minor reason for the situation may be a shortage of competent instructors, but the main reason appears to be a general lack of understanding of the nature of the work as adjusted to the school shop. This failure to understand the elements of metal work makes the selection of projects a perplexing problem for the instructor and is responsible for the failure of the average boy to reach an expected grade of workmanship.

Any school activity to be progressive must have a firm foundation in theory and a thorough understanding of all conditions involved. It is fitting to discuss some of the general conditions affecting the sheet metal shop activities in junior high schools.

The average ages of the boys in the junior high school are between 12 and 14 years: they are living in a constructive age; obliged to attend school; not so accustomed to the characteristics of metal as wood, but anxious to undertake real projects and enjoy the activities the shop affords. In general, metal work is little understood by school officials, and because of this lack of understanding shop space is inadequate, classes are large, and little money is available for new equipment.

Sheet metal is a product of natural ores, whose various characteristics are remarkably uniform due in large part to manufacturing processes. Like wood, some pieces of sheet metal are harder, tougher, or more springy than others and, although the two substances enter the shop with some like characteristics, a decided difference appears in the constructive methods and tools employed in shaping them into useful articles. In general, wood is worked by the use of edged tools (the saw, chisel, plane, etc.); the pieces are joined with nails, screws, dowels, glue, etc. Whatever method is employed in wood working, the same processes and the same kind of tools are used with the only exception that in the factory the tools may be power driven.

Unlike wood, sheet metal objects may be made in various ways and by different methods. The method accepted by school officials to be the best plan for school shops may be designated as the local shop plan. Applying this method, various pieces of sheet metal are shaped to a pattern by the use of tinner's snips or squaring shears; then folded by a process called "forming." Pieces are attached by suitable seams, soldered, or riveted, and finally edges are finished by a hem or turning a wire under the metal.

A carpenter can build a large variety of projects, from a box to a house, with a few common hand tools. With the exercise of skill, the box or house may be a credit to the workman. Because of the nature of wood and its working qualities, complete objects may be made by hand tools.

A sheet metal worker's kit of tools consists of a square tinner's snips, hammer, dividers, scriber, punches, mallet, and rule. The range of objects made by these hand tools alone is very limited. The sheet metal worker must rely on various bench machines, stakes, tools, etc., to form articles of sheet metal. Unlike the woodworker, the sheet metal worker is forced to adopt machines or devices other than hand tools, to make his articles.

Another marked difference between wood and sheet metal is to be found in quality of wood and metal objects made on a productive basis. Factory-made furniture cannot compare with the hand-made product of a skilled mechanic because it lacks the individual touch of a mechanic. The secret lies in the fact that each piece must be worked individually in order to build the most beauty into it. Wood objects put on a productive basis tend to cheapen rather than increase in value.

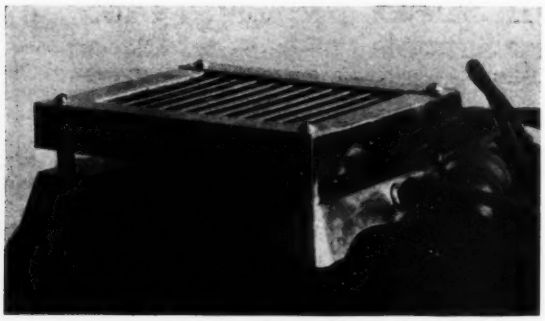
Unlike articles made of wood, sheet metal projects put on a productive basis tend to increase in perfection. The reason is that sheet metal is a uniform product and is treated in the factory by special equipment with high grade tools. The product resulting represents identically perfect results.

The local shop method of producing sheet metal products has grown gradually as the public demand has led the sheet metal workers to devise means of duplicating their products more economically and rapidly. At present sheet metal articles are made in factories with tools designed by skilled workmen in such a manner that unskilled men can reproduce the articles in huge quantities as well as could the best skilled mechanic.

One element of the factory method of reproducing

ELECTRIC GRILL AND TOOLS USED IN ITS PRODUCTION.

(See Page 295 for List of Tools.)



THE ELECTRIC GRILL.

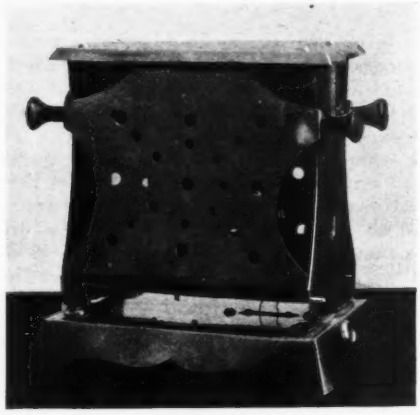
sheet metal objects is common to the school sheet metal shop. It is the element of unskilled workmen. Although boys are not in the school shop for production purposes, the fact that the factory successfully uses unskilled labor suggests the possibility of borrowing from the factory those methods which make it possible to produce goods of a high quality. The writer has found that a semi-factory plan, which does not eliminate the use of any hand tools and does not put the school shop on a purely productive basis, serves the best purpose of teaching boys the elements of sheet metal work and of overcoming their lack of skill. The method is similar to that employed in local shops where small numbers of articles must be made, partly with the use of hand tools and partly with the use of shop made special machines and devices.

It has been proven in factories that unskilled workmen can produce anything provided the operations of the several machines are so arranged that they are within the ability of an unskilled man to control. Applying this experience to the junior high school, it is feasible to produce first class projects in sheet metal provided the teacher properly designs the articles and devises methods of construction which average boys of that age can undertake.

Tools made for use in sheet metal shops are adjusted to the size and strength of the average mechanic, and to his skill and experience. In order to successfully carry on sheet metal work in the junior high school, the tools must be of such kind that they relieve the boy of the necessity for strength, skill, and experience, which he can not have. For the same reason it is necessary to devise bench equipment to perform the operations according to the unskilled experience of the boy. Operations which can not be controlled by boys with tools, must necessarily be analyzed and other methods adopted or changes in the design of the project must be made.

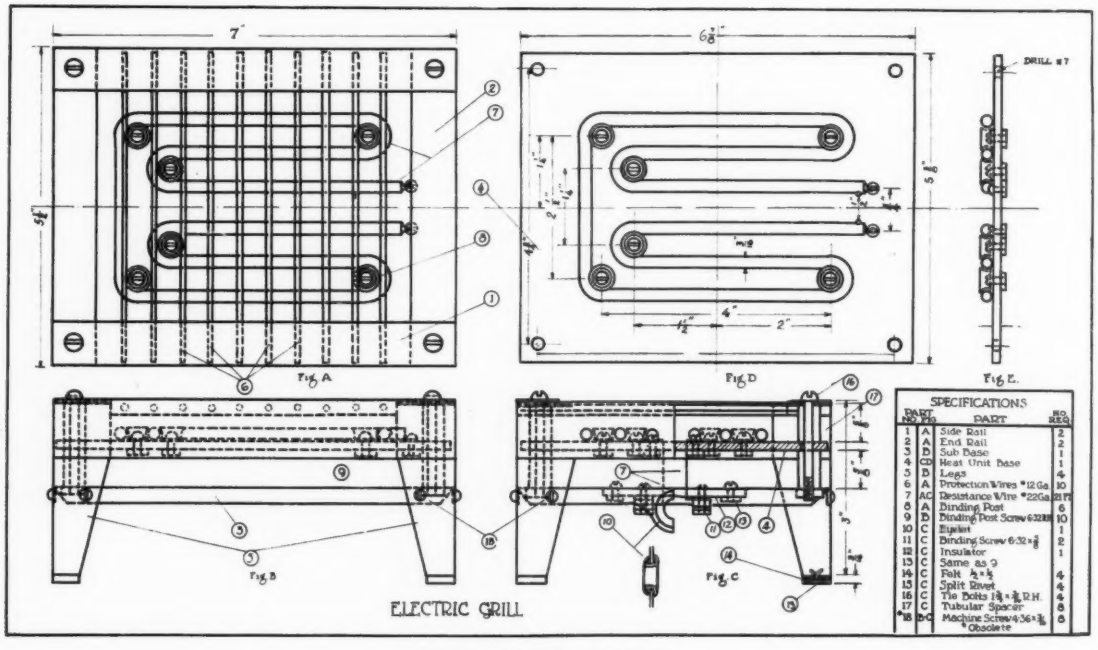
The Selection of Projects

The intelligent selection of projects determines, in a measure, the success of a sheet metal course. Useful



A TOASTER.

articles which boys will be eager to acquire and for which there will be a ready market deserve first consideration. A study should be made of the design and construction of each project to determine whether it can be broken up into a reasonable number of parts with operations that can be performed with tools suitable for boys to control. There is value in selecting high grade projects made of high grade material which will require careful workmanship.


7"
Fig. A
Fig. B
Fig. C
Fig. D
Fig. E
DRILL #7
ELECTRIC GRILL
SPECIFICATIONS
PART NO. | REQ. | PART | NO. REQ.
1 A Side Rail 2
2 A End Rail 2
3 B Sub Base 1
4 CD Heat Unit Base 1
5 B Legs 4
6 A Protection Wires #12 Ga. 10
7 AC Resistance Wire #22Ga. 21 Ft.
8 A Binding Post 6
9 D Binding Post Screw 6-32 x 3/8 10
10 C Eyelet 1
11 C Binding Screw 6-32 x 3/8 2
12 C Insulator 1
13 C Same as 9
14 C Felt 1/2 x 1/2 4
15 C Split Rivet 4
16 C Tie Bolts 1 1/4 x 3/8 R.H. 4
17 C Tubular Spacer 8
* 18 D-C Machine Screw 4-36 x 3/8 8
* Obsolete

DETAILS OF ELECTRIC GRILL.

In the selection of projects, the possibility of teaching related facts concerning metal in an organized and untechnical way should be considered. The boy should have an opportunity of learning that certain pieces of metal can be punched while others are drilled; some pieces may be bent while others will return immediately to their previous form after bending. A course so designed that the boy will understand how various metals will act will show the result of his knowledge in better workmanship.

An Electric Grill

The accompanying illustration shows an electric grill which represents a high grade project made by the semi-factory plan. It can be produced either by a group of boys working together, or by an individual working alone. The following bench tools and other devices are used:

A	Folder, with extra head
B	Bench punch
1A	Side-Rail Templet
2	End Rail Punching Jig
2A	End Rail Templet
C	Tube Former
5B	Leg Forming Fixture
5	Leg Punching Jig
5A	Leg Templet
7	Locating Pins
4	Sub Base Punching Jig and Templet
6	Heat Unit Drilling Jig

The following hand tools are used in connection with the bench tools to make the grill: Tinner's snips, half round file, screw driver, flat nose pliers, small steel square, scriber, two-foot rule, mallet, hand drill, twist drills, hack saw, clamps.

Following is an analysis of the operations:

ELECTRIC GRILL
Operation Analysis

Stock—26 gauge, cold rolled sheet steel, full pickled, white pickled, full annealed and full cold rolled.

Side Rail—Piece 1, Figure A, Drawing 202.
1. Cut out stock 7¼ in. x 2¼ in.
2. By jig 1 punch all holes.
3. Scribe to templet 1A and cut out.
4. Straighten edges.
5. Form with folder, wide side to head 2, side A.
6. Inspect.
7. Buff with emery (grade 150) on cotton wheel.
8. Polish with lime on cotton wheel.
9. Oil and wrap in oil paper.
10. Nickle and polish with lime wheel.

End Rail—Piece 2, Figure B, Drawing 202.
1. Cut stock to 5¾ in. x 2¼ in.
2. By jig 2 punch all holes.

A BOX MADE BY THE METHOD DESCRIBED.

3. Scribe to templet 2A and cut. Repeat operations 4 to 10 inclusive of piece 1, figure A, drawing 202.

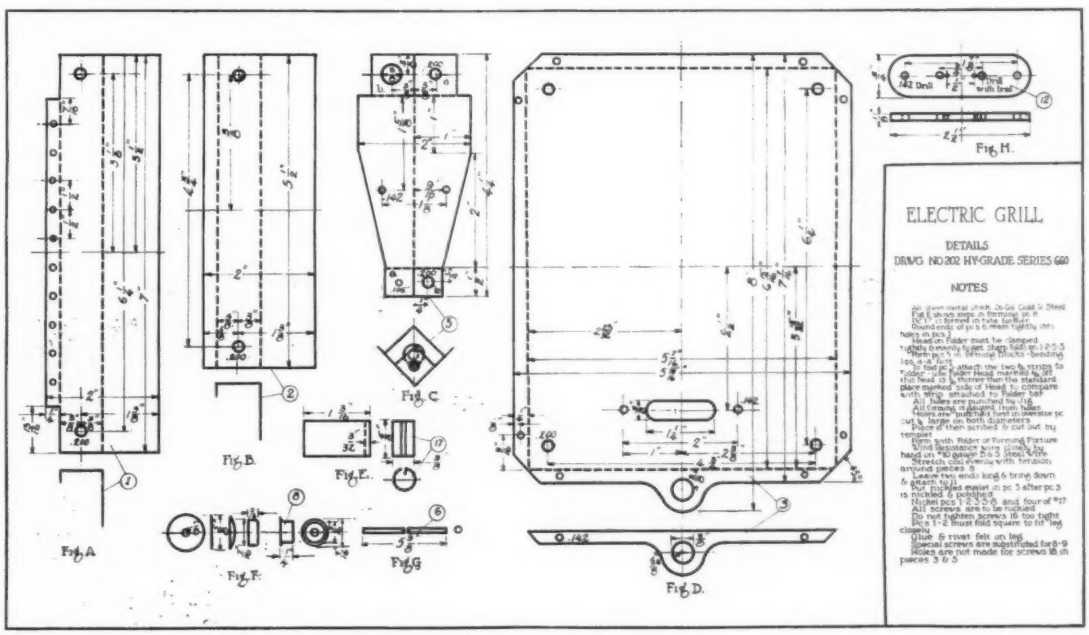
Sub-base—Piece 3, Figure D, Drawing 202.
1. Cut stock to 8¼ in. x 6¼ in.
2. By jig 4 punch all holes. (a) Scribe around jig, templet 4.
3. Straighten edges.
4. File curved projection.
5. Cut out and file slot.
6. Attach strips to folder.
7. Fold ends using head 3, side B.
8. Fold sides using head 3, side B.
9. Repeat operations 6 to 10 inclusive of piece 1, figure A, drawing 202.

Legs—Piece 5, Figure C, Drawing 202.
1. Cut stock to 4½ in. x 2¼ in.
2. By jig 5, punch all holes.
3. By templet 5A scribe and cut out.
4. Straighten.
5. Fold by placing like holes over corresponding pins on folder, using head 2, side A.
6. Bend top and bottom on leg forming fixture 5b. (a) Bend lips aa (figure C, drawing 202) first.
   Repeat operations 6 to 10 inclusive of piece 1, figure A, drawing 202.

Tubular Spacers—Piece 17, Figure E, Drawing 202.
1. Cut piece 1⅛ in. x ⅝ in.
2. Form in tube former.
3. Square ends with mallet on hardwood block. Repeat operations 6 to 10 inclusive of piece 1, figure A, drawing 202.

Protection Wires—Piece 6, Figure G, Drawing 202.
1. Cut from 12 gauge copper covered wire pieces 5⅝ in long.
2. Taper ends slightly on grinder or with file.
3. Straighten on block of hardwood.

Heat Unit Base—Piece 4, Figure D, Drawing 201.
Stock—Transite wood ⅛ in. thick, sanded on one side.
1. Cut from sheet a piece 6⅞ in. x 5⅝ in. Use hand saw.
2. By jig drill all holes.



DETAILS OF ELECTRIC GRILL.

Insulator—Piece 12, Figure H, Drawing 202.
1. Same stock as above, cut piece 2½ in. x ¾ in.
2. Round ends on grinder.
3. Drill all holes as shown in drawing. (a) Small hole may be drilled with a brad.

Resistance Wire—Piece 7, Figure A, Drawing 201.
1. Support piece of wood with ⅜ in. hole in vise.
2. Clamp 10, gauge rod and resistance wire end in drill chuck.
3. Support rod in wood close to chuck.
4. Wind close for 13 in. in length. (a) See photo below.

Felt Pad—Piece 14, Figure C, Drawing 201.
1. Cut out of ⅜ in. felt a piece ½ in. square.
2. Punch hole with brad.

Assembly of Heat Unit
1. Ream both ends of resistance wire, leaving suitable length to extend through slot in sub-base.
2. Attach pieces 8 and 9.
3. Wind coil evenly around piece 8 as shown in drawing 201, figure D.

Assembly—General
1. Ream protection wires into corresponding holes in piece 1, figure A, drawing 201.
2. Insert tie bolt 16.
3. Turn parts assembled upside down.
4. Put end rails in place.
5. Place the four legs over the four corner bolts.
6. Place one spacer (not nickled) over the same four bolts.
7. Place heat unit assembly in place.
8. Place one spacer (nickled) over the same bolts.
9. Assemble insulator piece 12 to sub-base.
10. Put sub-base in place.
11. Bind units together with tie bolts 16.
12. Polish lightly with lime.
13. Attach appliance cord.
14. Test for short circuit.
15. Test finally to full heat.
16. Fasten felt pad to legs with glue and split rivets.

The bench tools and other devices used in making this grill, the blower and the bench punch, will accommodate a large variety of work.

It will be noticed that the pieces are punched before they are shaped to size, and are then shaped and formed from the holes punched. The reason is that boys are unable to cut a piece of metal accurately enough to work it from its edges.

Automotive Essentials

I- The Secelective Transmission

Ray F. Kuns, Automotive Trades School, Cincinnati

CONSTRUCTION practice in the manufacture of transmissions has been pretty well standardized for some years. The design of the transmission case or gear box, with the exception of the method of mounting, is similar in most instances. There are two plans of mounting the transmission case. In earlier practice more cars carried the transmission mounted amidships. At present the greatest percentage of cars carry their transmissions mounted as a unit with the engine to comprise what is commonly spoken of as the unit power plant. The transmission illustrated herewith is of the last mentioned type and is what is commonly spoken of as a standard shift type. When transmissions are mounted as a unit with the power plant, a bell housing is cast onto, or bolted onto, the case or gear box. This bell housing, besides serving for a mounting and aligning member, also serves as a fly wheel and clutch housing. This prevents dirt and dust from entering and harming these parts. When a transmission is mounted amidships, the case has mounting bosses or lugs cast on it for this purpose. The transmission is then connected to the clutch and fly wheel by means of short shafts and one or two universals.

Copyright 1925 by Ray F. Kuns.

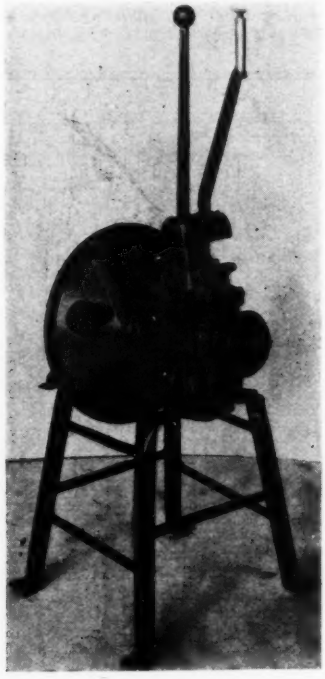


FIG. 1.
A STANDARD TYPE TRANSMISSION.

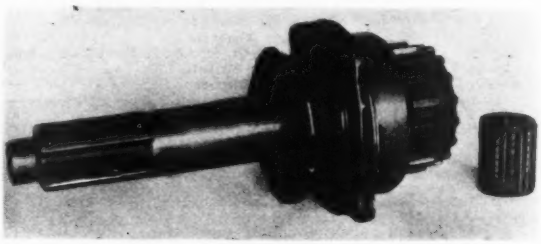


FIG. 2. THE CLUTCH SHAFT.

A stand has been provided for mounting this transmission for class demonstration. The case may be lifted from the stand by removing several bolts. The legs of the stand are one inch pipe and the cross braces are one-half inch pipe. All screws are an easy running fit and the model is quickly disassembled or reassembled.

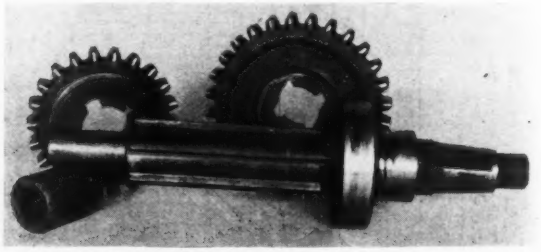


FIG. 3. TRANSMISSION SHAFT AND SLIDING GEARS.

Names applied to transmission parts vary slightly in various makes and in different localities. The part illustrated in Fig. 2 is ordinarily known as the clutch shaft, since it usually carries the driven clutch plate or plates on its forward end. It transmits the power from the engine to the transmission where it is directed through the several channels which give neutral, reverse, low,

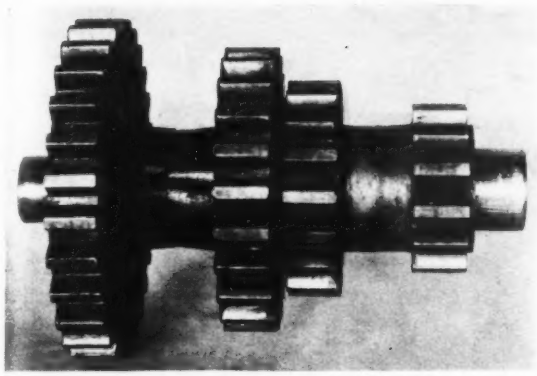


FIG. 4. COUNTER SHAFT AND COUNTER SHAFT GEARS.

second, or intermediate, and high speed. The gear carried on this shaft, and which is usually an intergral part of it, is the key point in transmission design since it is the point at which the line of flow of the power from the engine is directed into the various channels which give the speed changes. This is illustrated fully in later figures. This gear also carries within it either a bronze or a roller bearing, the latter type in this instance, which serves to carry the forward end of the transmission shaft.

The transmission shaft is illustrated in Fig. 3. It is also known as the main shaft and the sliding gear shaft. The bearing mentioned above is shown lying under the end of the shaft it carries. When it is in place in the driving gear on the clutch shaft and the transmission shaft assembled to it the two shafts appear as one. As suggested above, the break in the flow of power at this point is the vital consideration in the design. At different car speeds the clutch shaft turns at different speeds from the transmission shaft. The transmission shaft is never turned faster than the clutch shaft. In neutral it is not turned at all. In low, second, and reverse it turns slower than the clutch shaft, and in high it turns at a one-to-one ratio.

The gear on the clutch shaft is known as the driving gear, since it is engaged with and drives the large gear on the counter shaft shown in Fig. 4. All gears on this shaft are locked to it. All gears on this shaft, excepting the largest one, are driving gears. The small one drives the idler reverse gear all the time. This in turn drives the reverse sliding gear when it is shifted into mesh with it. The second smallest gear drives the car when the shift lever is in low position. The second largest drives the car when the gear shift lever is in second speed position. The counter shaft, or jack shaft as it is sometimes called, is turning at all times when the car is in motion, except in the case of the design of the Dodge Brothers car. The oil level is usually carried about to the center of this shaft and the gears on it throw the lubricant to the upper levels when the car is moving.

The arrangement of the shifting forks with reference to the sliding gears is illustrated in Fig. 5. The counter shaft has been placed under the sliding gears in their neutral position. Shifting the speed change lever to a forward (toward engine) position will move one or other of the sliding gears backward and vice versa. Shifting the small sliding gear gives second and high speeds. Shifting the larger sliding gear to its two positions gives low and reverse speeds.

In Fig. 6 all shafts and gears, excepting reverse, have been assembled in their normal relation. The arrow and line indicates the flow of power from the engine to the clutch shaft and driving gear and thence to the counter shaft and its gears. Since no sliding gear is engaged with any of the four driving gears there is no driving of the car at any speed in any direction, consequently the gearset is said to be in a neutral position.

In Fig. 7 the large sliding gear has been shifted forward. This causes it to engage the low speed drive gear on the counter shaft and the car moves forward at a rate of speed approximately one-third of its normal high rate of speed. The line and arrow indicate the direction of flow of power through the gearset for low speed forward.

For second speed forward, which is intermediate in most passenger cars, the shift lever is brought to a neutral position which disengages the low speed drive sliding gear, and then as it is crossed through neutral position and is carried on forward, the small sliding gear is thrown backward and engaged with the second speed drive gear (Fig. 8).

When the speed change lever is again brought to neutral, the second speed driving gear on the counter shaft is again free. As the lever is carried straight back the second speed sliding gear is thrown forward and engaged with the clutch shaft driving gear. This is made possible through a dog clutch arrangement, consisting of an internal gear in the sliding gear and the short stepped-down section of the teeth of the driving gear meshing together. This results in locking the two shafts, clutch and transmission, together in such a manner that they turn as one. Accordingly when speaking of high speed drive, a one-to-one ratio is said to exist. All the speed reduction between the engine and the rear wheels is then that which exists in the rear axle drive gears. This is normally four or five to one. The position for the gears in high or direct drive is indicated in Fig. 9.

Reverse gear is more or less confusing to most beginners in automotive work. If one gear is used to drive another gear the direction in which the second is driven is just reversed over that of the first one. Consequently the counter shaft turns in an opposite direction from that of the driving gear and clutch shaft. Again when a gear on the counter shaft turns a gear on the sliding gear or transmission shaft, the direction is again reversed. The net result is that the transmission shaft turns in the same direction as the clutch shaft, for all

FIG. 5. SHIFTING FORKS WITH SLIDING GEARS IN POSITION.

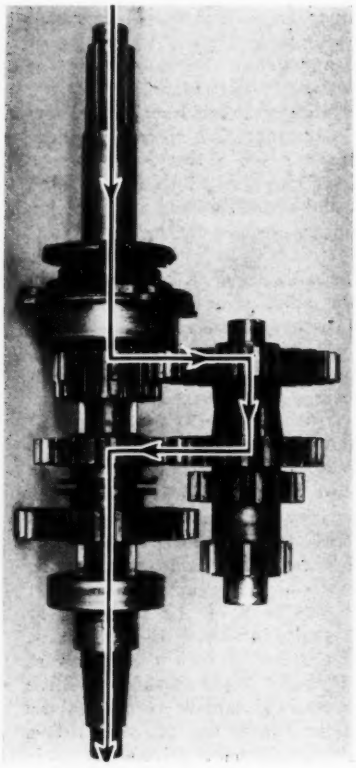


FIG. 6.

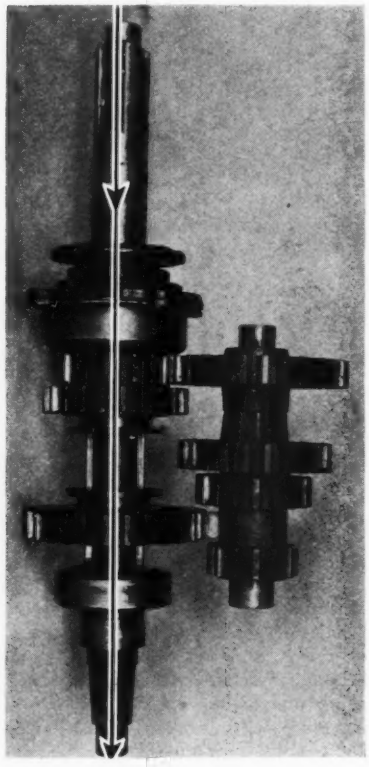


FIG. 8.

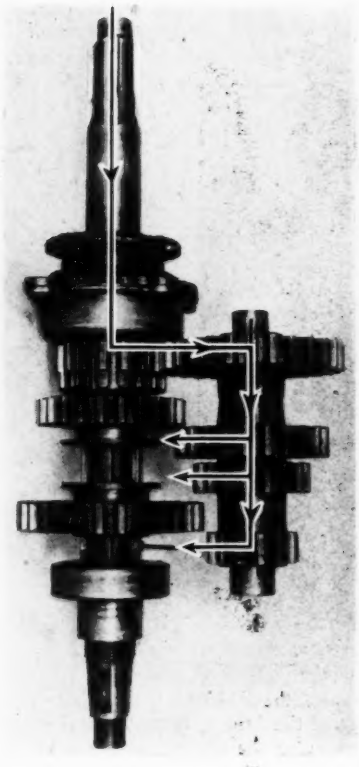


FIG. 7.

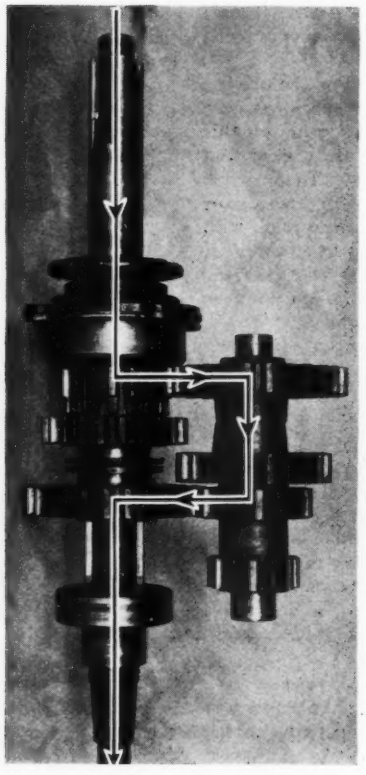


FIG. 9.

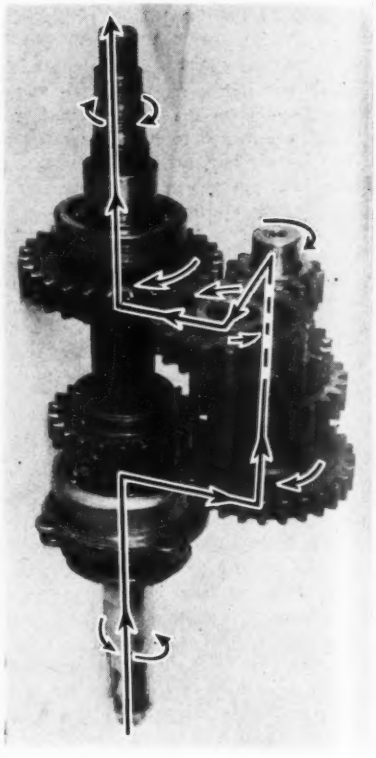


FIG. 10.

FIG. 6. NEUTRAL POSITION.
FIG. 7. LOW SPEED FORWARD.
FIG. 8. SECOND SPEED POSITION.
FIG. 9. HIGH SPEED OR DIRECT DRIVE POSITION.
FIG. 10. GEARS IN POSITION FOR REVERSE DRIVE.

FIG. 11. TRANSMISSION PARTS.

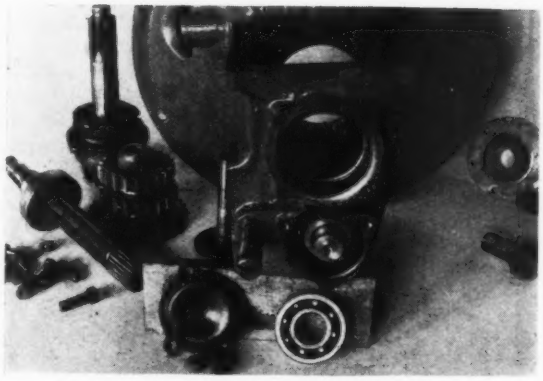


FIG. 12. INSERTING COUNTER SHAFT AND GEARS.

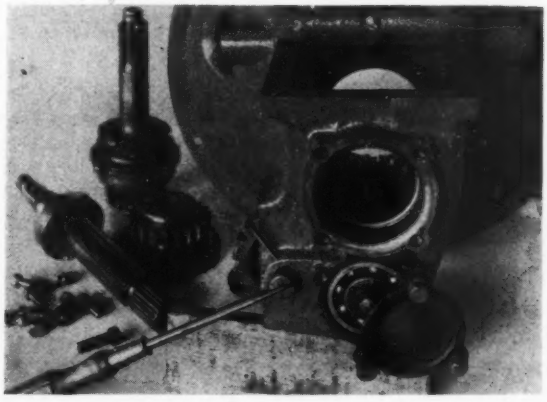


FIG. 13. INSTALLING COUNTER SHAFT BEARING AND REVERSE IDLER GEAR.

speeds but reverse. In reverse, however, the sliding gear is driven from an idler gear and not directly from the counter shaft drive gear. The introduction of this extra gear, called the reverse idler gear, is necessary to obtain this change of direction of drive. By following the arrows and lines in Fig. 10, the flow of power from the clutch shaft to the transmission shaft and the direction of rotation of gears may be noted and studied.

Fig. 11 shows all of the parts of the transmission completely disassembled.

In starting to build up the transmission, the first step is the insertion of the counter shaft as appears in Fig. 12.

In Fig. 13 the counter shaft bearings have been placed in position and the cover with its grease retaining

FIG. 14. INSERTING CLUTCH SHAFT.

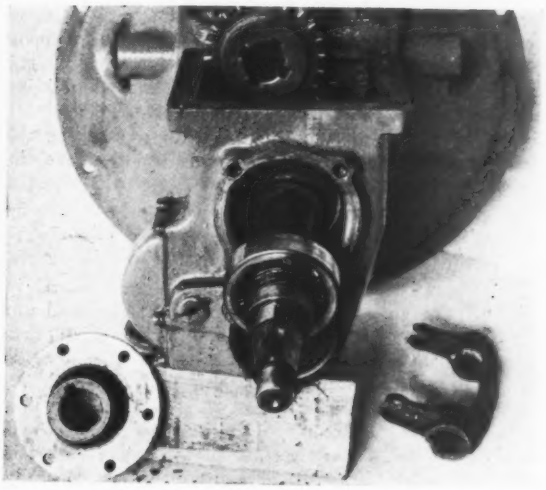


FIG. 15. INSTALL'NG TRANSMISSION SHAFT AND SLIDING GEARS.

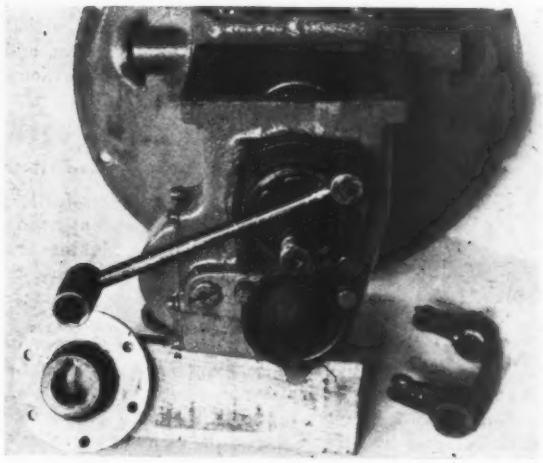


FIG. 16. MOUNTING THE BEARING RETAINING FLANGE.

gasket is partially in position and the shaft has been driven almost home. At this point it is necessary to use a screwdriver to align the hole in the shaft with the holes, in the boss on the case, which receive the tapered pin which holds the shaft in place.

Fig. 14 shows the clutch shaft introduced through the bell housing. By referring to Fig. 2 it will be noted

that this shaft carries a ball bearing and a mounting flange. Back of the flange is a spacer. This spacer and the adjusting collar in the mounting flange form an arrangement which locks and compresses the felt grease retaining washer between them. It is very essential to see that the grease retaining washer is in good condition. Much trouble results from oil and grease finding its way from the transmission case into the clutch housing, there to soften or gum the clutch facings and thus cause a failure of these parts.

Fig. 15 shows the installation of the transmission shaft and the sliding gears. During this operation a number of points must be closely checked. In the first place, the bearing within the driving gear on the clutch shaft must be placed and lubricated. In some instances a special ball or other thrust member is provided to position the clutch and transmission shafts with reference to each other. In other cases shims are provided back of the mounting flanges, and these are depended on to properly position the respective shafts. The same arrangement is frequently used to provide an adjustment for taking play out of the counter shaft mounting. The next point to make certain of is to see that the sliding gears are properly installed on the shaft and ready to receive the shifting yokes. The method of keeping the lubricant in the case is apparent in Fig. 16 where the adjustable collar shows just back of the wrench handle.

Fig. 16 also shows the use of the wrench in tightening the bearing retaining flange. The universal joint flange and the clutch throw-out yoke also appear in this picture.

In Fig. 17 the yoke and flange have been placed in position. The cotter key which locks the castellated nut in position is being entered. The transmission case cover with the yokes and shifting shafts assembled is ready to drop into position.

Where a transmission or gear set is to go into service, the lubricant is usually placed in it before the cover is placed in position. Make certain that a proper gasket is in position under the cover. Tighten all screws carefully and give the entire job a final check.

A word of caution might be given with reference to the final assembly. If the transmission cover with its yokes is placed in a partially assembled position so that the yokes engage in the collars on the sliding gears, and the gear shift lever is moved to successive speed positions, the workman can see whether the gears mesh for their full width in all cases. A frequent cause of gears wearing tapered and popping out of mesh on a pull is improper meshing, either due to careless shifting or due to an improper assembly of the transmission. In some instances the shifting fork position is adjustable, which

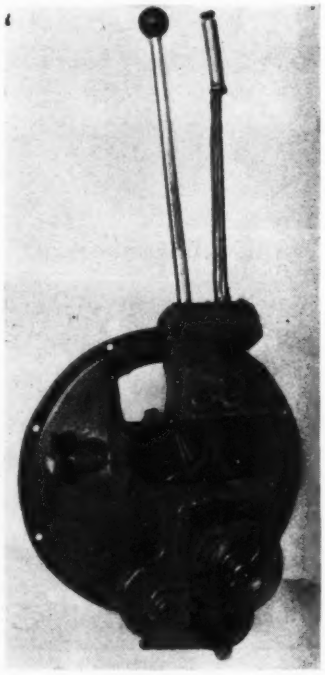


FIG. 17.
FINAL STEPS IN ASSEMBLY INCLUDE INSTALLING UNIVERSAL FLANGE, TRANSMISSION, CASE COVER WITH YOKES AND CLUTCH THROW-OUT YOKE.

makes the gear position likewise readily adjustable. In other instances the position of the counter shaft gears may be changed slightly by arranging the shims or other adjustments properly. In still other instances the trouble may be helped by installing new shift yokes, or reforming the old ones which may have been sprung.

Competitive Bidding in the School Pattern Shop

Howard G. Olivit, Late Instructor in Trade-Pattern Making, East Technical High School, Cleveland, Ohio

ONE of the first essentials of a successful lesson in any subject is interest and attention on the part of the students. Making the subject-matter of the lesson attractive enough to create interest and attention is the teacher's job, and is sometimes quite a problem.

In most schools nowadays, there are two types of studies, required and elective. Where a subject is required, interest sometimes has to be created by the teacher; where it is elective, usually interest has caused the choosing of that particular work. I know of no subject in the industrial arts where the teacher has a bigger problem of creating interest than in the work of pattern making. The reason for this is very evident. Some subjects, like electricity, for instance, are rather spectacular; others furnish some sort of attractive articles to be taken home and placed on exhibition in the living room. These articles are shown to the neighbors as the handiwork of the young hopeful, and this creates a pride of accomplishment on the part of the boy, which serves as an incentive for further effort. Not so with pattern making. Pattern making is rather abstruse, especially for the women of the family. There is nothing attractive about this work to the fair sex. If a pattern is brought home for inspection, it does not mean much to mother; it is nothing she can use, consequently her interest is rather passive. So far as father is concerned, he is either too busy, or more likely in this day is a specialist in some line where he does not come in contact with pattern work at all; he wants John to do well, and if he doesn't measure up, John will be brought to time. There his fatherly responsibility ends; it's up to the teacher to do the rest.

With these conditions facing him, the teacher is confronted with a class of thirty boys whose ideas of pattern making are more than vague, and more than likely whose interest is quite dull. Assuming that he is an expert in his work, three things are necessary on the part of the class for the successful handling of this group, namely, interest, attention, and pride. If, as a class, they possess

these three things, there is good timber among them for a class of specializers in this work later on.

Curiosity is not interest, neither is it attention. Interest is the mother of attention, and attention is the mother of knowledge. It is impossible to secure attention without interest or interest without attention. Both occur at the same time, but attention is constantly changing according to the stimulus that arises to attract it. Consequently the teacher has to provide a stimulus greater than that which is constantly arising, in order to command attention in its fullest sense. If he is fortunate in securing interest and attention, he will in time notice the growth of pride. What is pride and how may it be encouraged? Pride is the noble esteem of one's self, not conceit nor extreme self-esteem; it develops self-respect. One of the ways it may be encouraged is by making clear to the worker the significance and importance of his particular operation in relation to the economical accomplishment of this purpose, after having intelligently acquainted him with the complete finished product of which his operation is a part, and the purpose of the finished product in the world. The time to impart this information to the worker is when he is a student in school.

Competitive bidding in the school pattern shop is one of the best methods of creating and maintaining interest, that I have found. I am referring particularly to the specializer in pattern making, the boy who puts in the major portion of his time in the school shop at this work, with the idea of earning his living at it after graduation. True, there are those who would discourage this kind of work in school, and who ridicule even the thought of education along this or similar lines of endeavor, but Leavitt, in his "Examples of Industrial Education," says, "All cannot have and do not need the same education. Industrial education is strongly individualistic. It means the fitting of a particular boy for a particular job. It provides participation in, rather than preparation for some activity."

Following this line of thought somewhat, I introduced competitive bidding in my classes with quite some success, and I pass it on in the hope that it may help some one else.

There are two kinds of pattern shops; the first is known as the corporation shop. This type of pattern shop is a part of a great organization governed by a corporation, and in which men are known generally by number only. The second is the job shop. This type of shop is usually owned and operated by an individual who has put in some time at the bench, and has saved a few hundred dollars with which to start in business. He is dependent for his success on his ability to out-bid his competitors, and in this way secure enough work to keep his business running. He has in his employ anywhere from two to probably twenty men.

In order to enjoy success in its fullest sense either as a pattern maker, or as an employer of pattern makers, one must know something of the economics of pattern making, one feature of which is competitive bidding.

The specializer I have in mind is required to put in three terms at pattern making. In a class of say twenty boys, there will be first term, second term, and third term boys, with a consequent range in problems according to difficulty of construction, but with the same problem as regards competitive bidding.

I have said that the job shop proprietor is dependent for his success on his ability to out-bid his competitor. It follows, then, that in order to bid successfully, he must have some basic element on which to bid. This is always reduced to the same answer; he must bid on the ability and skill of the men in his employ, which really means that before he has secured the work in question, he has made up his mind which one of his men is to construct the piece in case he lands the job.

The teacher's first job, then, is to get his class together and explain the foregoing economics of pattern making to the class, pointing out the individual responsibility of each boy to his employer, which in this case is the teacher. Here the teacher has a wonderful chance to interpret and increase the importance of dependability on these young minds. If the workman is absent from his work for a day, nothing is done on his pattern, and the whole job is held up; the customer complains and the employer is placed in an embarrassing position. Both employer and employee get their income from the same source and consequently must cooperate, and they cannot cooperate unless they learn how to do so somewhere, either through observation or instruction. Here the school shop functions.

You will pass out your drawings to your boys and ask for a figure or price on the work in terms of hours. Your boy will be puzzled beyond words. After a while he will come sheepishly to you and tell you he doesn't know how long it will take him to make it. Then let him guess, but get an answer from him that is entirely his own and don't let him know what you think about it. Keep a record of his estimate. Take the same drawing to the next boy, with the same instructions. Do this with three or four boys; keep a record of each boy's estimate; give the job to the lowest bidder, and inform each one as to the different estimates given. The boys who bid high will declare it impossible for the low bidder to make the piece in the number of hours proposed, while the low bidder will find that in order to stand well and to make or to keep his reputation in the work in which they are all interested, he will have to work fast. He makes up his mind to fool the rest of the group at all cost and he works toward that end, and usually makes good, too.

Suppose he fails. It means that next time his judgment will be given a little more carefully, based on his experience in the first job; and the high bidder? If the low bidder fails, he assumes a sort of "I told you so" attitude and more than likely is due for a surprise later on; if he wins, the high bidder's judgment will be more carefully given next time, and thus through experiences of this sort these boys are brought into early contact with methods with which they must eventually become familiar.

I imagine there are those who are skeptical as regards the success of this plan, due, as they reason, to the inexperience of the boy as a mechanic. Remember this; your boy is now working against time; he knows he cannot start a new piece whenever he makes a mistake and still finish in the time limit, and time is the factor that is too often forgotten in our work of training these boys. Many times I have inquired about a boy who has been placed in a job after being graduated from high school, and heard the same answer, namely, "Yes, he does good work, but it takes him too long; he has no conception of the value of time."

There are many situations that will arise under this scheme that cannot be explained or answered, except by the teacher in charge and only as they present themselves, but I know that the effort expended in using the system will be well worth while. Your boys will develop into better mechanics, and their ability to measure time and effort will be strengthened, while as estimators they will outclass the fellows without this experience. If you wish to make it still more interesting, adopt an imaginary or make-believe monetary rating system in conjunction with the above, and watch the reaction you get.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

FINE AND USEFUL

"I believe that beauty is coming back to the useful arts." This last article of The Art Creed of Bonnie E. Snow is the direct and significant expression of her splendid faith.

As the great leaders of art education pass away those who continue the work are charged with the responsibility of their faith. Such a faith is infectious. Once, inspired with a love of beauty, the teacher of art becomes optimistic and effective. Art is so general and varied in its application, that teachers of other subjects are teachers of art, in degree as they enjoy and love the beautiful. But beauty is as varied in kind as are the arts. Miss Snow's faith in the return of beauty to the useful arts is based on her expressed belief that "Art is to be shorn of its mystery and vagueness and is about to take its place as a teachable, demonstrable science." To dispel the mystery and vagueness of art it must be made subject to understanding and reason. Cause and effect must be traced and identified to clear the mysteries of art and make it a teachable school subject.

The most important step in the direction of standardizing art instruction was the recognition by Miss Snow and her associates that the obligation of art instruction in the public schools was distinct over the purpose of the professional art school. The art school is in the business of developing professional artists. The public schools are in the business of developing appreciative consumers of art production. These institutions differ in purpose and should differ accordingly in methods and content of instruction. The art school must develop appreciation and skill along one selected line of interest. The public schools should develop appreciation of beauty as expressed in a variety of interests.

It is, however, necessary for public-school instruction in art to be confined to a limited range of interests. The teachable content of a limited range of interests common to the community is the best subject content for art education. Art education must impress appropriate design of those useful things which each community enjoys. This may not be the most ambitious program that can be conceived for art education but it is the most effective limited program that can be carried out. Industrial arts include these interests. It includes the interests of home and community common to the country. It includes the interests of imported commodities of common use in the home and community.

The appreciation of ancient art production has but little direct bearing on art education for the American community. Historical style is the device of communities that have passed. They may happen to be appropriate to a modern situation. They are of great interest as exposing the life and customs of ancient peoples. They belong to a study of history and of esthetics as a result of social conditions, but the art of any modern community is least concerned with precedent and most concerned with the expression of life as developed in that community.

The pedagogy of art is the pedagogy of other school subjects.

The child must experience the composition of elements as a self expression in order to fully appreciate. Hearsay is not effective in learning; it is less effective in education. Information must be made the result of personal experience in order to become effective. To this end the art education of the child must be constantly applied and must be made the logical conclusion from cause to effect.

When Miss Snow expressed the belief that "Beauty is coming back to the useful arts," she expressed her faith in a pedagogy that insists on the thoughtful device of projects in school which expresses the simplest and most direct statement of purpose. Beauty is the measure of success with which a design is accomplished. Fine art and useful art are not distinct commodities. They will become extinct if made distinct. There can be no industry without art, and no art without industry.

WHEN LEADERS PASS AWAY

The recent death of Miss Bonnie Snow and the still more recent death of Mr. Hugo Froehlich shock us into a realization of the fact that the ranks of the leaders in art, industrial arts, and kindred work are rapidly thinning. Mr. Griffith's death a year ago was a reminder of the same sad fact.

Somehow, great enterprises and great movements are always bound up in the personalities of their leaders. The industrial arts movement has just commanded the attention of one brief generation. Sometimes we are so disposed to identify the movement with the individuals who have led it, that we can scarcely think of the movement or cause separated from these individuals. It is difficult to think of the practical education and industrial arts work without seeing them personfied in the lives of Woodward, Richards, Bennett, Snow, Froehlich, Griffith, Dow, Seegmiller, Prosser, and others.

Now, the "old guard" is passing away. Happily there are left many of the most virile and active leaders, but a heavy toll is being taken every year. To one who has for a quarter of a century come in contact with this leadership, a meeting of industrial arts workers now seems to be made up largely of strange young men and women.

Such a state of affairs in the industrial arts field is, after all, a perfectly natural thing. It only seems a little unnatural to those who saw the movement grow from its infancy and who have never before seen a new leadership grow up in that field.

The leaders who are passing have builded well. They have left a perfectly permanent impress on the thought and work of their time. Their places seem well nigh impossible to fill, because they had the fire and enthusiasm and zeal of the reformer and the pioneer. They grew up before the mad scramble for position and salary became the national pastime and the professional ideal. They worked for the love of the task that was heavy and with a vision of a cause that was worthy. They struggled against odds and worked without equipment and without money and materials.

Heavy as were these burdens, they were not to be compared to the burdens imposed by an unsympathetic public attitude. They fought the powers and the systems of education when it was unpopular and seemingly fanatical to espouse their cause. Miss Snow and Mr. Froehlich and Mr. Griffith lived to see their cherished dreams cease to be dreams and become a living, working reality. Others who are still left and who worked hand in hand with these faithful servants are now enjoying the sight of well developed departments of art and industrial arts in every city in the land. They are happy in the consciousness of some contribution to this marvelous achievement in one short generation.

The leadership is changing—must change. It need not deteriorate. It is for the new leaders to perfect and to systematize and to coordinate the great working principles and artistic ideals that the old leadership conceived. A weak and unworthy leadership prompted by less worthy motives, inspired by lower ideals, and driven by a waning zeal, might easily lose for the industrial arts work most of the prestige that these earlier leaders gained for it through struggle and stress and sacrifice.

The hope of the next generation, so far as the industrial arts work is concerned, lies in the perpetuation of the spirit and the ideals of these earlier leaders. The present teachers in the teacher-training institutions can do no greater service to aspiring young teachers than to inspire them with the zeal and the earnest enthusiasm and the high idealism of such men and women as those leaders in the industrial arts fields who have in the comparatively recent years gone to their final reward. These men and women who have wrought so well must not be forgotten. Their lives and their achievements must be kept fresh and vivid in the minds of the rising generation.

HUGO B. FROEHLICH

Edwin Osgood Grover

The bare news of Mr. Froehlich's death reached me in Oberlin, Ohio, while on my way east for the summer, with a request for a brief sketch of Mr. Froehlich's work as an artist, a teacher and a man. It is a strange tragedy that Mr. Froehlich's going should follow so closely the death of Miss Bonnie E. Snow, with whom he was associated as editor and author for so many years.

I first came to know Mr. Froehlich when he was head of the Department of Design at Pratt Institute, Brooklyn, where he succeeded Mr. Arthur W. Dow, who had just gone to Columbia University. It was as head of the Department of Design at Pratt Institute that Mr. Froehlich made for himself a national reputation as a teacher of color and design.

About 1903 he was invited to become editor, with Miss Snow, of the art publications of the Prang Company. Their first important work was the editing of the "Textbooks of Art Education" which marked an epoch in the teaching of art in America. Later they edited the "Art Education Drawing Books," "The Progressive Drawing Books" and "The Graphic Drawing Books." Probably the work by which Mr. Froehlich will be longest remembered is the series of "Industrial Art Textbooks" of which he and Miss Snow were joint authors. These books were a real contribution to art education in America, and did more to promote and shape the industrial arts movement in this country than any other single influence.

But, it was as a teacher that Mr. Froehlich made a great name for himself and left a deep impress upon the lives of literally thousands of students who came in contact with him at Pratt Institute, the New York School of Fine and Applied Art, or the Prang Summer School of Art of which he was the director for many years.

The news of his death will bring a sense of personal loss to a great company of art teachers and workers throughout the country.

Mr. Froehlich was a man of distinguished bearing, patient, calm and courteous. Yet, underneath his dignity was a keen sense of humor and a playful spirit that made him a delightful companion and an inimitable toastmaster. Anyone who did not know this boyish spirit of playfulness in Mr. Froehlich did not know the real man.

Mr. Froehlich lived a rich and useful life. He made several notable contributions to the teaching art in America and left a host of friends to mourn his passing—a record of which any man might be proud. The teaching of art in America for many years to come will bear the impress of his teaching and his delightful personality.

KEEP A HAMMERIN' AWAY

If your shop is old,
"No money," you're told,
Keep a hammerin' away.

When the fight seems lost,
"Too much the cost,"
Keep a hammerin' away.

Hold your shop in mind
And a way you'll find,
Keep a hammerin' away.

If the school board's slow,
Or they've said, "No,"
Keep a hammerin' away.

Six years I've fought,
I've a new shop,
Keep a hammerin' away.

—William L. Hunter.

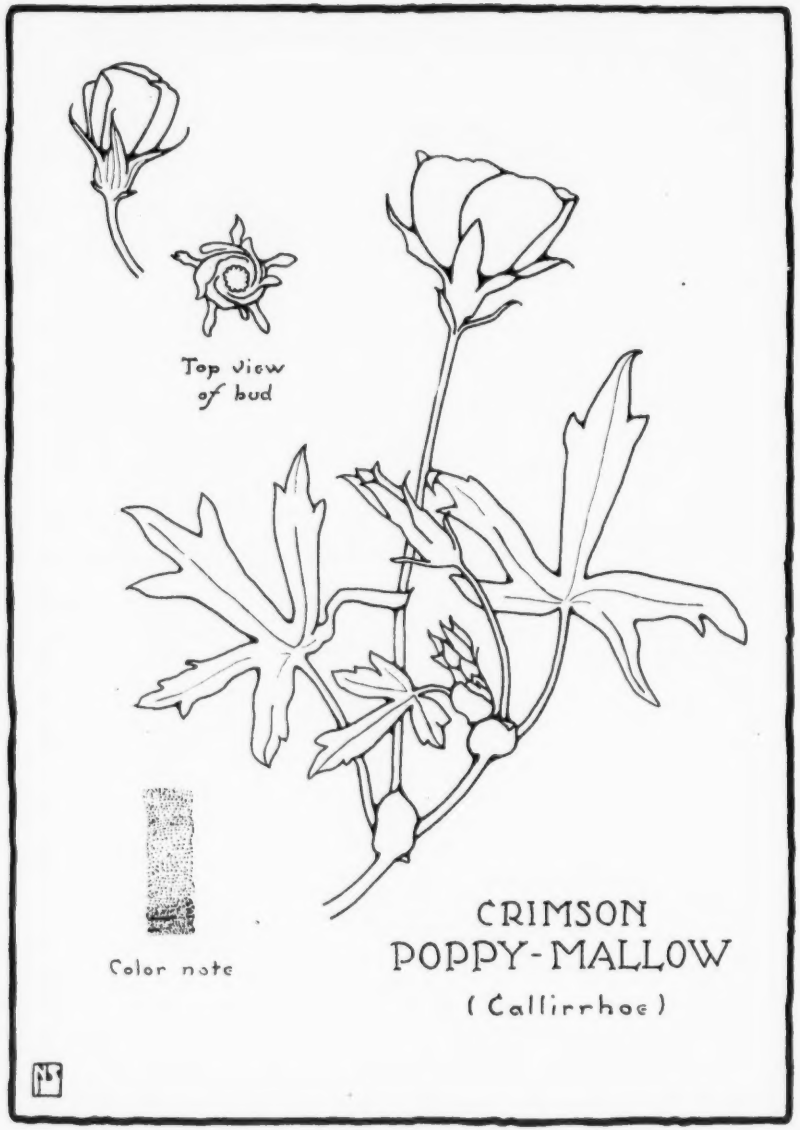


PLATE 5.

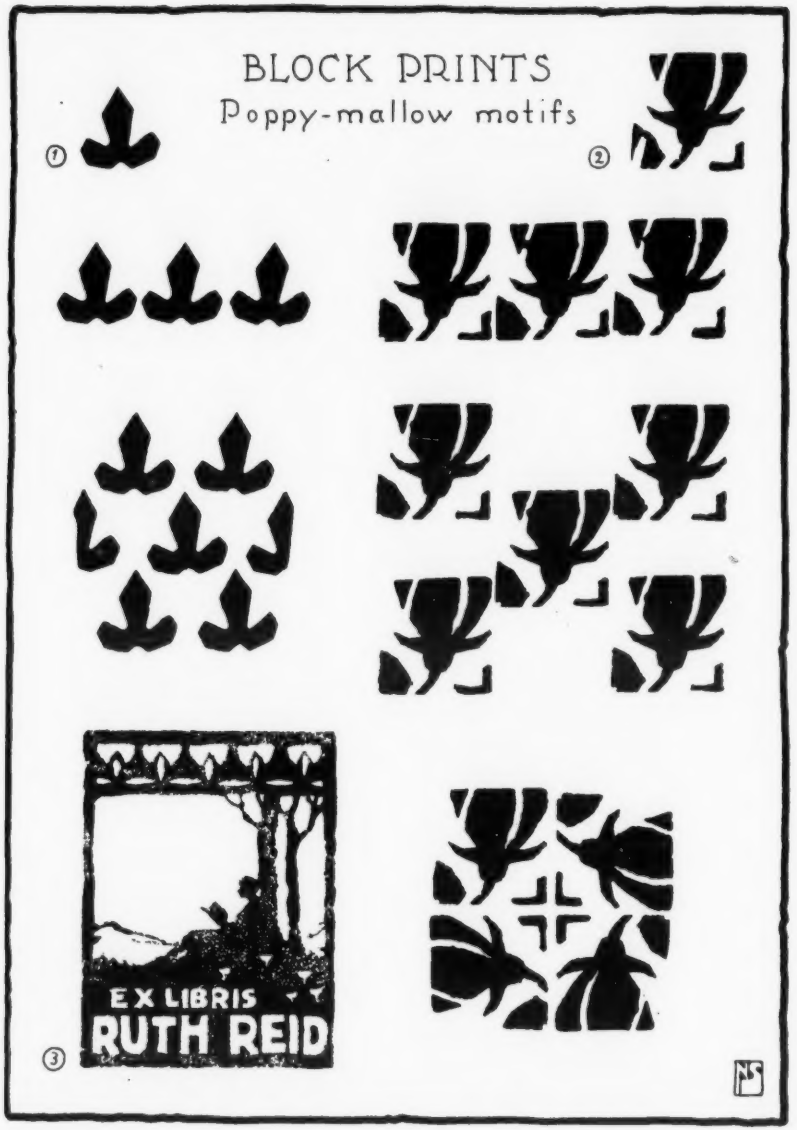
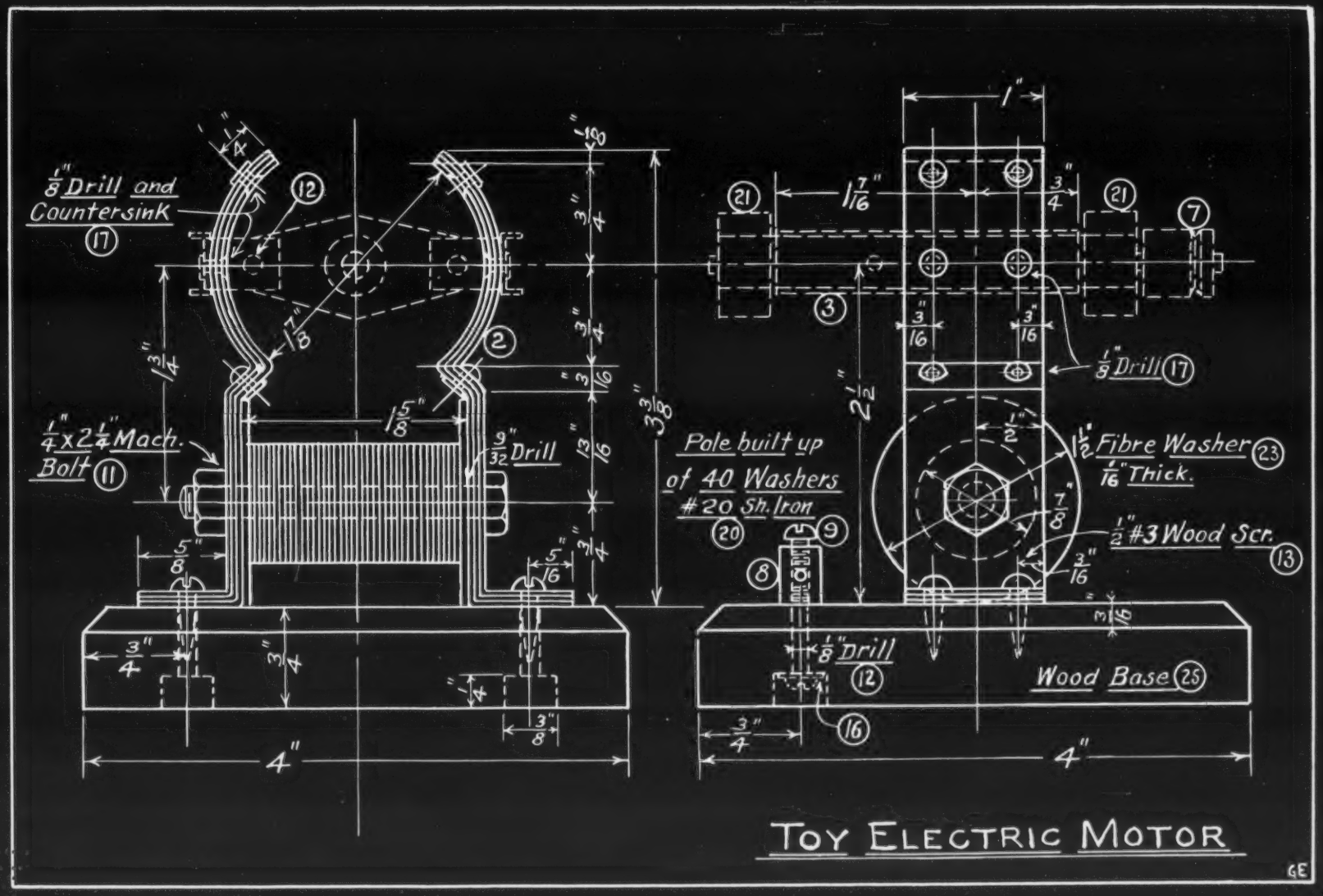
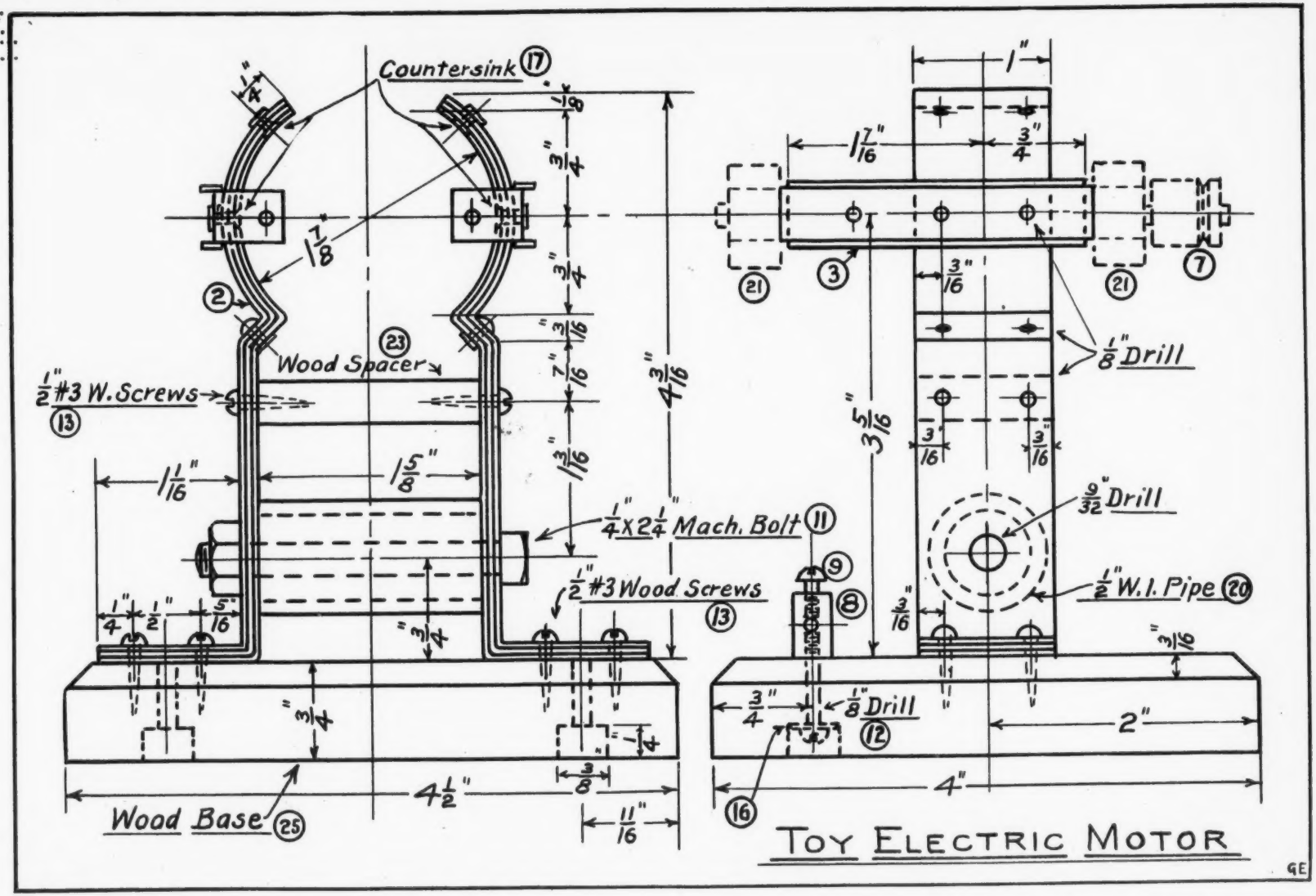


PLATE 6.


1/8" Drill and Countersink (17)
1/4" x 2 1/4" Mach. Bolt (11)
9/32" Drill
Pole built up of 40 Washers #20 Sh. Iron (20)
1/2" Fibre Washer 1/16" Thick. (23)
1/2" #3 Wood Scr. (13)
1/8" Drill (17)
1/8" Drill (12)
Wood Base (25)
4"
4"
TOY ELECTRIC MOTOR
GE

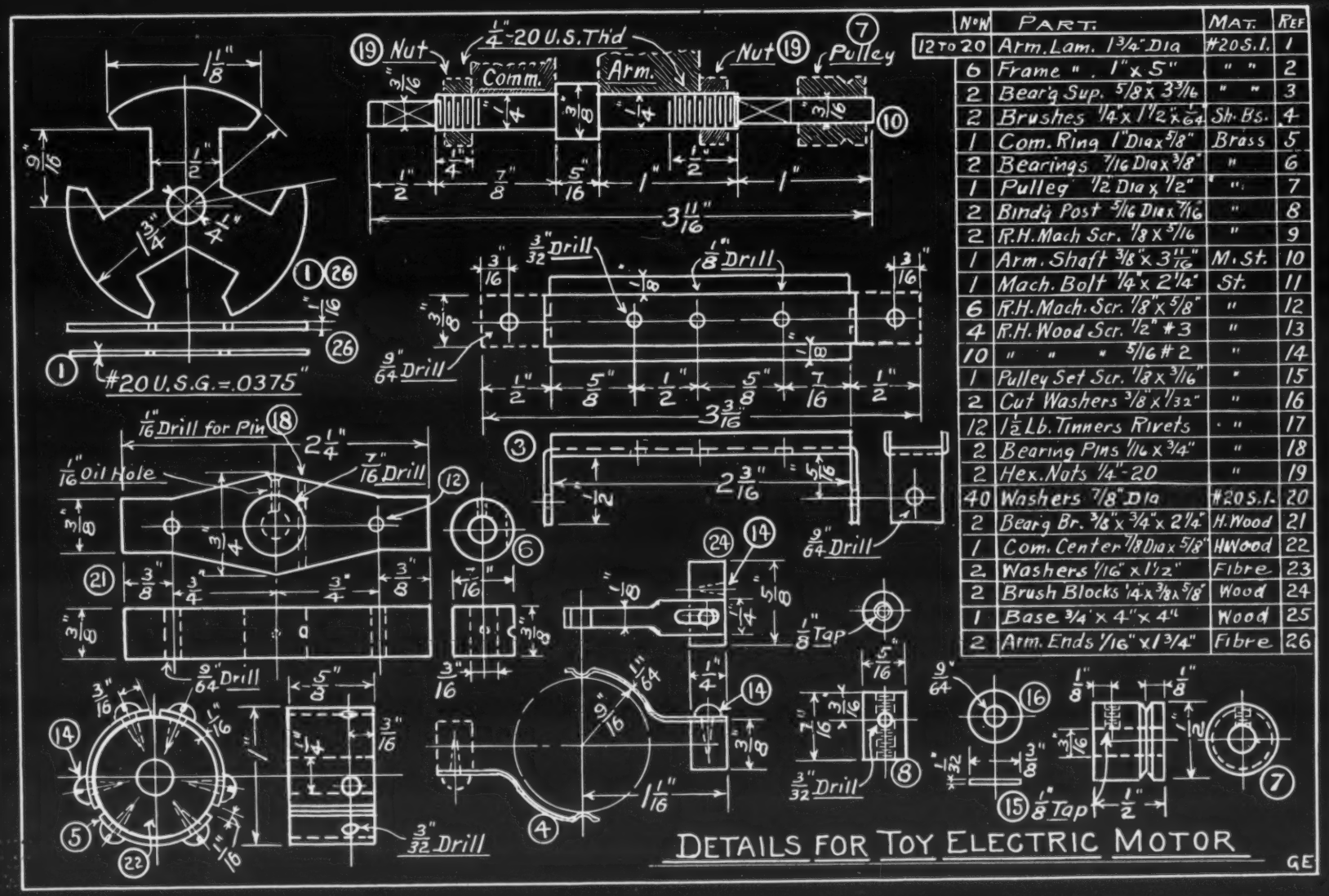


Alternate Design.

Supplement to the Industrial-Arts Magazine, August, 1925.
Copyright, 1925, Bruce Publishing Company.

Alternate Design.

Supplement to the Industrial-Arts Magazine, August, 1925.
Copyright, 1925, Bruce Publishing Company.



No'N	PART.	MAT.	REF
12 TO 20	Arm. Lam. 1 3/4" Dia	#20 S.I.	1
6	Frame " . 1" x 5"	" "	2
2	Bear'g Sup. 5/8 x 3 3/16	" "	3
2	Brushes 1/4" x 1/2" x 64	Sh. Bs.	4
1	Com. Ring 1" Dia x 5/8"	Brass	5
2	Bearings 7/16 Dia x 3/8"	"	6
1	Pulley 1/2 Dia x 1/2"	"	7
2	Bind'g Post 5/16 Dia x 7/16"	"	8
2	R.H. Mach Scr. 1/8 x 3/16	"	9
1	Arm. Shaft 3/8" x 3 11/16"	M. St.	10
1	Mach. Bolt 1/4" x 2 1/4"	St.	11
6	R.H. Mach. Scr. 1/8" x 5/8"	"	12
4	R.H. Wood Scr. 1/2" #3	"	13
10	" " " 5/16 #2	"	14
1	Pulley Set Scr. 1/8 x 3/16"	"	15
2	Cut Washers 3/8" x 1/32"	"	16
12	1/2 Lb. Tinners Rivets	"	17
2	Bearing Pins 1/16 x 3/4"	"	18
2	Hex. Nuts 1/4"-20	"	19
40	Washers 7/8" Dia	#20 S.I.	20
2	Bear'g Br. 3/8" x 3/4" x 2 1/4"	H. Wood	21
1	Com. Center 1/8 Dia x 5/8"	H. Wood	22
2	Washers 1/16" x 1 1/2"	Fibre	23
2	Brush Blocks 1/4 x 3/8 x 5/8"	Wood	24
1	Base 3/4" x 4" x 4"	Wood	25
2	Arm. Ends 1/16" x 1 3/4"	Fibre	26

TOY ELECTRIC MOTOR

S. L. Coover, Beaver Falls, Pa.

The Armature (Fig. 1). The armature core is made of 20 gauge black sheet iron. Any number of laminations from twelve to 24 may be used, depending upon the speed and power desired. Twelve laminations will give approximately 1,000 R. P. M. Two pieces of 1/16" fiber are cut similar to the laminations. One is placed on each side of the core for insulation. The core is fastened to the shaft by a ¼" machined hexagonal nut. Each pole is then wrapped with tape, ¼" strips, wet with shellac. This will insulate the wires and prevent the armature from becoming short-circuited. With the commutator end of the armature toward you, wrap each pole clockwise, with twenty turns of shellacked double, cotton-covered magnet wire, 22 gauge. The beginning of the winding for pole one is fastened to the commutator segment which is directly opposite. The end of the winding is fastened to the second segment. The winding for pole two begins on segment two, and ends on segment three. The winding for pole three begins on segment three, and ends on segment one.

The Field (Figs. 2 and 3). Each of the poles is made as shown on the blue print from three pieces of 20-gauge black sheet iron. The blanks are cut 1" x 6". The three pieces are then riveted together with the two rivets shown at F, figures 2 and 3. All sharp bends are made in a vise. The curved part can be formed over a conductor stake or a piece of pipe two inches in diameter. All of the rivets and screw holes are now drilled as shown on the blue print.

The Commutator (Figs. 5 and 6). The core is made of wood on a lathe. The segments are made of sheet brass of convenient thickness. The brass is formed over some round object one inch in diameter, and is then divided into three equal parts. It is held in place by a ¼" machined hexagonal nut. The distance between segments is 1/16".

Note the method of countersinking rivets, Fig. 9. Countersink rivets in the curved part of field only. After each pole has been riveted at the top and the side bearing support A, Fig. 3, has been riveted in place, the poles are joined together as shown in Fig. 2, by means of a bolt through a ½" pipe. The pipe is insulated with heavy paper or empire tape. The pipe is then wrapped with 250 turns of 20-gauge double, cotton-covered magnet wire.

Fasten the binding posts to the base, one inch from the front and one inch from each side. Fasten the field to the base as shown in Fig. 2. The armature bearings and armature are put in place. The brushes, Fig. 10, are held to the side bearing support by a ⅜" No. 2 brass screw, which goes through hole A, Fig. 7. The direction of the motor can be reversed by reversing the brushes.

Connection for Motor. Connect one end of the field coil to one of the binding posts on the motor base. Run the other field coil lead to one of the brass brushes. Connect a wire from the remaining binding post on the motor base to the other brush. This is a "series" connection.

The motor is wound for direct current. It will run with current supplied from four dry cells, or more if additional power is required. It will also run from a six or eight-volt storage battery.

The poles may be made of soft iron ⅛" thickness instead of the three pieces of 20-gauge sheet iron, as shown on the blue print.

Supplement to the Industrial-Arts Magazine, August, 1925.
Copyright, 1925, Bruce Publishing Company.

Wild Flower Designs

ARTICLE III: DESIGN APPLICATION

Nettie S. Smith

The Crimson Poppy-Mallow

This is a common favorite in the mid-western states. The deep, cup-like blossom is composed of five crimson petals—white near the base. The structure of the flower center is a distinguishing characteristic of the Mallow family. The many stamens are united in a single column surrounding the pistils, which mature on different days than the stamens, thus securing cross-pollination. The flowers reopen for several days, giving friendly insects opportunity to carry pollen to and fro. The leaves vary from the rounded forms to the incisely lobed ones, shown in the drawing, Plate 5.

Color Notes

If the hues and gradations of colors seen in a plant are noted with a few brush strokes of water-color they will be useful later in choosing color schemes for designs.

Beauty and Life

Happy is the child that is learning to see beauty in nature about him, and to appreciate some of the subtle design and wonder of its plan. Happier still is he who has learned; he can express some of these same ideas in making things both useful and beautiful.

Mankind has always shown a hunger for beauty and has tried in many ways to satisfy it. This esthetic longing and his material needs can be met at the same time by useful objects that are beautiful. Home, clothing, and objects of daily use should be beautiful, and true beauty will in no way interfere with their usefulness.

That is what is meant by *Unity*. A good rule in decoration is to keep the ornament subordinate to the object and its purpose. Then all together it is a complete unit.

Block Printing

This is one of the simplest means of decoration and even beginners can make much use of it. The method described here is so simple that it can be used effectively at once and this will give the confidence necessary for doing more advanced work.

A raw potato and a paring knife are all that are necessary to make a block that will produce some beautiful effects. The first block, Plate 6 (1), was cut on the smooth surface of a half potato. A piece of felt a little larger than the figure was laid in the lid of the color box and saturated with water-color. The block was pressed against this little "inking pad" and then onto a drawing pad. The repeats were thus made easily and rapidly and various arrangements tried out. Squared paper is a help in arranging all-over patterns.

The square block (2) was cut from an art gum eraser which is easily cut and makes a durable block. This design shows *Informal* or *Occult Balance*. A border composed of units in this kind of balance may have a continuous rhythm more interesting than a border made of symmetrical units. Block (2) is also shown in an all-over pattern and in a group figure. Prints may be cut out and moved about to find pleasing arrangements for patterns.

The bookplate design (3) was cut on a linoleum block. This design happened to print rather lightly, giving the grainy texture which often adds interest to a block print. Handsome bookplates may be made by printing with India ink or with oil paint.

Complete directions for block printing have often been published in school, art, and other magazines and books. After a student has made this simple beginning with potato blocks and water-colors, he will have confidence to venture as far as he likes in this new craft that is now opened to him.

Objects to Decorate

Some of the things that may be made beautiful by means of block printing are: Book covers, note books, folios, boxes, cards, envelopes, fabrics, curtains, pillows, dresses, scarfs, and many other things. Original plans will develop with awakening enthusiasm.

Ship Model Making

Burl N. Osburn, Sioux City, Iowa

Without a breeze, without a tide
She steadies with upright keel.
—Coleridge, The Ancient Mariner.

IF one is looking for an absorbing, broad, and remunerative hobby it might be worth while to investigate the building of ship models as a solution to the quest. It seems to have all the good qualities of most worth-while hobbies and some of its own, though it is likely to become so fascinating and demand so much time as to make one's other occupations and duties seem intrusive. One difference between the ship model hobby and other lies in the fact that it requires rather definite and more or less technical information that cannot be obtained by reading condensed books on the subject, for these are rare and rather expensive, but must be gained by diligent search and fragmentary gathering, all of which may take as much time as the actual work itself. In this search the reader is especially fortunate if he happens to have an historical interest in the days when men went to sea, as they went abroad on land, in all the bright colors and ornate decorations their imaginations could produce; or if he loves to read of early voyages and explorations, when mariners went forth "to seeke out, discover, and finde, whatsoever Iles, Countreyes, Regions, or Provinces, of the Heathennes and Infidelles, whatsoever they bee, and in what parte of the worlde soever they bee." If he so desires "to seek out" such reading he will discover much that will not only be of use in model building but will acquire a store of related information of real interest.

These sidelines of interest are so numerous and varied as to almost defy cataloging. A very fragmentary list of some of the more closely related subjects would include such things as the evolution and development of the many forms of ships and of special parts of ships, methods of handling ships, tacking, etc., battle formations, kinds of cannon, shot, etc., names of ship parts, compasses, watches, and officers. The sailors themselves come in for their share of attention with respect to how they lived on ship, what they ate (and drank), their peculiar superstitions and omens, their costumes, their chanteys, etc. Other items are concerned with flags, their forms, colors, emblems, and etiquette; heraldry with its shields, crests, and peculiar terminology. It is not nec-

essary, of course, that one know all there is to be known about all of these things, yet much of it must be known about the particular model that is being made.

The halftone shown on this page is made from a photograph and does not show the many details as they should be shown, nor, of course, the colors. When this model was first completed I took it to school and set it on top of a very prosaic filing cabinet. On entering my office some time later I found a circle of wondering youngsters standing about, staring in amazement at the model. I was just in time to hear one boy exclaim, "Look at the ship," whereupon I took unto myself considerable satisfaction. Perhaps Howard Pyle's "Attack on a Galleon" hanging just above it gave them some clue, but at any rate, it passed in their minds for a ship, and most folks take my word for it that it was intended to represent a seventeenth century British second-rater.

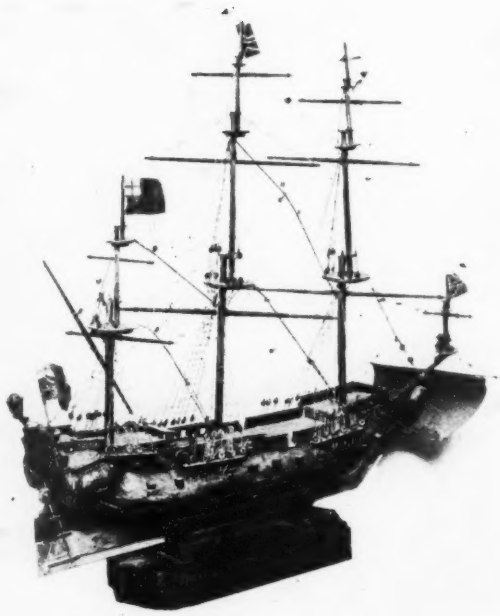
This type is characterized by the tall fore and main masts, the short mizzen with its rakish lateen sail, the jaunty sprit-mast over the lion figurehead, and the carved and gilded floral wreaths around the upper ports.

The hull was shaped from a built-up block of pine by sawing it out on the band-saw first, then shaping up with chisels, gouges, scraper, and sandpaper. Templates were first made to show the lines of the hull at various points so that both sides would be alike. The high stern was cut out separately and fitted after the hull was almost completed. The lion and unicorn rampant, and other emblems that do not show here, were first built up of gesso, then cut to shape, though it would not doubt have been better to have cut them directly in the wood. Port holes were cut out square and cannon were turned and fitted in each. A port cover was made of heavy smooth cardboard to fit each one. Masts and yards were turned or shaped with a plane and carefully sanded. "Tops" or platforms, where the mast sections join, were turned and drilled to receive the masts, and small holes were drilled along the edge for the shrouds. The lower section of each mast was wound, since masts of that time were split. The most tedious part of the whole job came in making the blocks, known to the landlubber as pulleys, and the dead-eyes. These were about a quarter of an inch in diameter, the former having one hold through them and the latter three. There were some hundred and fifty of each to be be cut, drilled and fitted in place, all of which inclined me toward a simpler model for the next attempt.

All rigging was of crochet cotton, of various sizes, because it closely resembles rope in miniature. After it was in place it was stained with asphaltum in which there was a little shellac—just enough to slightly stiffen and hold the lines in place.

The hull was coated with a thin layer of gesso, then painted a dull white below the waterline, and a greenish brown above. This was rubbed through in spots to give an antique effect. Walls are green, rails orange, cannon black with red bands around the mouths; port covers orange; the lion is gilded; the ornaments at stern are almost all of these colors with red and yellow added. The starboard lantern is green, the port (known then as larboard) lantern red, and the large center lantern gilded.

The flags offered another interesting problem. The first thing, of course, was to have them correct in design for the time; after this it developed that they could not be flown on just any mast but must conform to strict custom and etiquette. On the sprit-mast at the bow is the Union Jack, on the fore-mast the ship's pennant and the flag of the ranking officer on board, on the main-mast the flag of the British Union, and on the mizzen and at the stern the "red standard." Cloth dipped in gesso and dried in the shape desired, worked very satisfactorily, since it could be flattened out while the design was painted on, but would spring back into place when released. This model was left without sails purposely, for its masts, yards and rigging offer a very interesting silhouette without sails. The whole model is mounted in cradles and on a black base.



A SHIP MODEL MADE BY THE AUTHOR.

One may count the value of his work in various ways. From a monetary standpoint, ship models are worth while as spare-time work, and indeed there are a number of small studios in which very good incomes are made by this most interesting work. From the standpoint of skill required, the model calls for it in many forms. As a bit of interesting work to do, it offers enough to satisfy the most ambitious, while its many sidelines are of real interest. To one who is historically inclined, perhaps its greatest work lies in the fact that it puts in concrete form the rather hazy images that usually form when one reads of things without "definitizing" them. It is one thing to know things in the way that comes from reading and forming mental images, but another thing to know them in the way that can form them into an objective reality.

THE FIRST DOMESTIC SCIENCE SCHOOL COTTAGE AMONG THE HIGH SCHOOLS OF WEST VIRGINIA

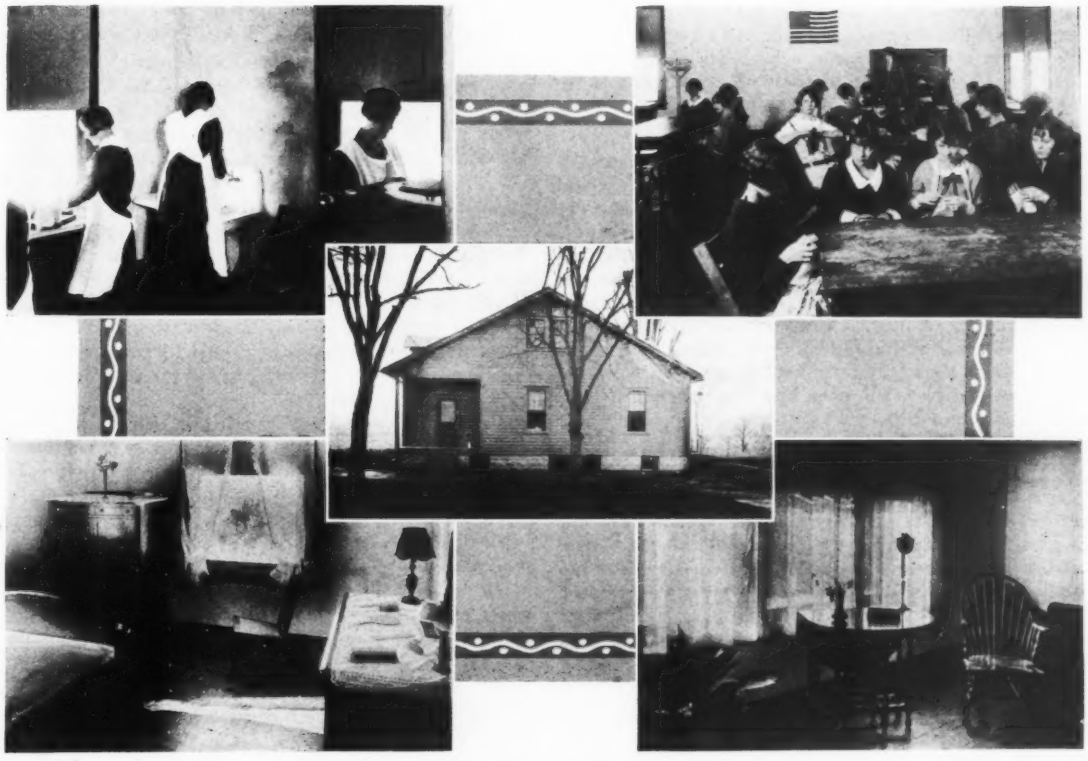
A. T. Stanforth, Superintendent of Schools, Point Pleasant, West Virginia

The cottage for the use of Domestic Science to be constructed in West Virginia was recently finished at Point Pleasant. The cottage was built and equipped with the idea of placing the work in domestic science and art under conditions as similar to home surroundings as possible.

The building is of one-story, frame construction and cost approximately $4,800. The work is organized under the provisions of the Smith-Hughes law and two teachers are employed.

The one outstanding feature, perhaps, of the building is found in the four unit kitchens arranged in separate and distinct groups. Each kitchen accommodates from four to six girls.

In addition to the four unit kitchens, each of which is nine feet by eleven in size, the building has a large sewing room, 11′ x 18′; a model bed room, 11′ x 12′; and a bath room 6′ x 8′. A small office for the supervisor is



DOMESTIC SCIENCE COTTAGE, PT. PLEASANT, W. VA.

located in the center of the building. The basement contains a laundry, 11′ x 16′, and a furnace room.

All class periods are 90 minutes in length. One hundred fifty minutes are devoted each day to domestic science and art, and related subjects.

All first and second-year girls are required to take the work in foods and clothing. Those enrolled in the foods class must take general science, and those enrolled in clothing must take nursing. About 140 girls are enrolled in the department of home economics.

The laundry equipment consists of two stationary tubs, a hot plate and table. The laundry is also used for experiments in textiles.

The girls in the foods class also manage the school cafeteria. The sewing room is so arranged that it can easily be converted into a lunch room.

SELLING VOCATIONAL AGRICULTURE TO SHELL ROCK, IOWA

Margaret B. Flynn, Cedar Falls, Iowa

A vocational agriculture department must be sold to the community. The factors that determine whether or not a community will buy the plan are the same factors any successful business man employs. These factors may be summed up as follows:

1. Have something worth while to sell.
2. Educate people to want the product.
3. Display the product to the community.
4. Advertise the product through several mediums.

The vocational agriculture department of the Shell Rock consolidated school has attempted to employ the business man's principles in selling agriculture to that community. In order to teach practical agriculture, a survey was made by the students and the instructor, and the data was tabulated. These findings indicated the needs of the farmer to be to grow and market hogs, cattle, poultry, corn, oats, and clover; for these activities are their major enterprises. Instruction along these lines, and in addition, some attention to horse and sheep husbandry, to orcharding, home gardening, and farm management constituted the course of study for this community. Over fifty per cent of the boys expected to follow farming as a life work after high school graduation. Twelve of the girls were fitting themselves to be rural school teachers. Each student was assisted in selecting a farm project that could be carried on at the home farm. Through the entire year an attempt was made to give a business-like atmosphere to every undertaking and to distinguish between essentials and non-essentials.

Every effort was made to keep the course in vocational agriculture basic rather than technical. An excessive amount of the offerings in secondary schools of agriculture now consist of technical knowledge. Much of this is incomprehensible to these untrained and immature minds, unrelated to their daily needs or knowledge, uninteresting because no associative bonds have been established, and impracticable in their lives. An examination of many of the textbooks now in use shows the presence of much technical knowledge. The instructor of agriculture at Shell Rock tried to impart the essentials of technical knowledge, and in all the instruction strove to link up principle with practice. In this way it was possible to have subject matter interesting, comprehensible, related, and useful; and this helped to insure permanent retention of the principles and practices.

In the study of corn, each student gathered a ten-ear sample of seed corn and entered it at a corn show held in connection with the school homecoming. The judge placed the samples, and after supper, he gave his reasons as well as an illustrated talk on corn production.

In the study of soils and crops, the best method of securing nitrogenous crop to add to corn feed was considered. The advisability of raising more acres of clover,

alfalfa, and soybeans at the expense of timothy acreage was recommended after much study and experimentation. The question of raising oats at a loss each year was considered, together with the possibility of finding a satisfactory and profitable substitute. The raising of some barley and winter wheat was looked upon with favor.

In the animal husbandry class, each student joined the free cow testing association conducted by the class, and as a result yearly records and tests were made by each form represented in the class. This led to the elimination of the most unprofitable cows, the balancing of rations, and the care and management of the herd. In the study of hogs the problem was somewhat different since the raising of hogs is well established in that community, and many of the fathers or their sons are raising prize-winning stock. The question studied was the best practices in selection, care, and management of hogs used in this community.

In the horticulture class, pruning of trees, grape vines and small shrubbery was done by the class. Requests come to the agriculture department to do similar work for the farmers. Spray calendars were worked out as a class project, and they were distributed to the homes. Varieties of apple trees that would ripen in early fall were selected by the class, and planted on the school grounds, and a program was formulated for the planting of other fall fruits. How to make the community of Shell Rock more attractive was a problem that called forth suggestions from parents and pupils alike, and the practical suggestions were acted upon. Then the problem became specific in that each pupil plotted his home yard with the idea of how he could make it more attractive and at the same time have plenty of fruit in succession.

The agricultural products were shown at the Butler County Framers' Institute held at Shell Rock during the winter. The members of the agriculture class were urged to make entries in order to discover the strong as well as the weak points of their products. Judging contests for the teams of the county added interest to the event. The members were given definite tasks to do in planning and conducting the institute, in answering questions about the entries and in meeting the speakers.

The biggest event is the Butler County Fair held at Allison, Iowa, each year. Calves, pigs, corn, small grain, vegetables, poultry, and fruits are entered by many members of the vocational agriculture class, and a few of these received substantial prizes. Another set of entries included collections of various diseases, pests, mounted specimens of common weeds with control measures suggested for each. Poster work showing the desirable methods of selection, production, and marketing called forth much interest.

While studying these problems, a few paragraphs of suggestions were kept in the local weekly paper, giving specific instructions and mentioning the activities of the class. Written reports of each project were required, and there was something to publish each week. Numerous inquiries began coming in from farmers and others wanting definite information for a specific situation.

All of the above methods were successful in the community of Shell Rock, Iowa, because existing conditions and needs were recognized; a practical line of work was offered; principles and practices were closely linked in every project, many instincts were appealed to; a business atmosphere was created for every undertaking; improvements in existing conditions were discovered, and vocational agriculture was advertised through several mediums. Needless to say this community was in favor of paying for this type of practical vocational agriculture.

A GARAGE AS A JUNIOR HIGH PROJECT

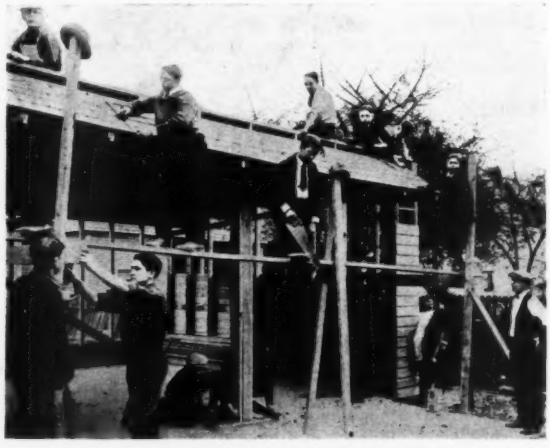
Herbert R. Troyer, Industrial Arts Instructor, Toledo, O.

HERE is a project for industrial arts instructors or supervisors who are interested in giving a touch of variety and practicability to their wood-working course. The garage, a frame structure, of two-car capacity, was constructed last fall by the classes in the junior high school level of Toledo, Ohio.

As a preparation for the job, the year before they went into the study of garage construction quite extensively, making plans, discussing advantages and disadvantages of different materials, and the other factors that must be considered before contemplating building. The result was the framework of a model garage, constructed on a one-fourth scale. This, of course, was done in the industrial arts shop.

Using this as a background, this year they conceived the idea of making the work practical as well as theoretical. The first thing to consider was the cost. One of the patrons of the school was planning to build a garage, and when the proposition was put up to him, he gladly agreed to furnish the material and hire a contractor to mix and pour the concrete for the floor and foundation. The boys of the seventh and eighth grades would then finish the work under the direction of the industrial arts instructor.

The work started a few weeks after school opened last fall. The boys first cleared the back of the lot of clothes lines, parts of old board fences, and two or three small trees, before the real work of construction could be begun. Then one day in the early part of October, the crew, armed with pick and shovel, broke ground for the new building. It was here that several of the boys learned for the first time, that a few little roots in the ground can cause an enormous amount of trouble when it comes to digging trenches.



THE BOYS ENJOYED THE JOB IMMENSELY.

They dug the trenches, and made the forms for the floor foundation and the approach. A local contractor was engaged to mix and pour the concrete. This seemed the most advisable thing to do, owing to the fact that each group that worked was on the job only one hour and a half at a time, that being the length of the regular class period. Also, on account of their immaturity, the work of mixing and handling the concrete would have been rather heavy for them.

The actual construction was started the latter part of October; and in one month, twenty working days, everything was finished except the wiring. The project was

new and interest keen, so the work moved along swiftly. They were greatly aided in the fact that they had almost no bad weather.

The wiring for the lights was done later by the eighth grade classes, when the electrical part of the industrial arts course got under way; not, however, until they had carefully gone over the rules and specifications approved by the city electrical code.

This is a project that in this case has worked out with perfect satisfaction to all concerned; including the

READY FOR FLIVVER OR PIERCE-ARROW.

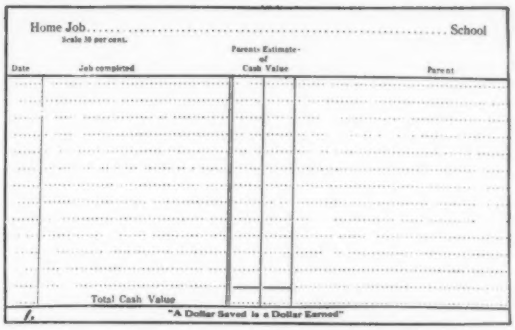
owner of the garage, the school authorities, the industrial arts instructor, and above all, the boys themselves.

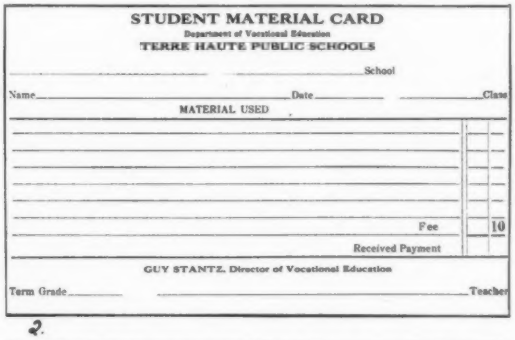
There are, however, a few things that must be considered by anyone who might want to try this as an industrial arts project. The school authorities must be in sympathy with it, as their cooperation is absolutely necessary for the success of the project. A site must be selected which is near the school building in order that too much time may not be wasted going to and from the job. It should not be more than three or four blocks away. The tools from the school shop are used, so there must be some means of caring for them. It is better to have a place at the job in which to keep them so they do not need to be checked in and out every day. The boys must be kept interested. There is a tendency on the part of the boys, especially at this age, to be interested only for a short duration of time. This can be helped by planning the work to keep them busy as much as possible and giving them as much responsibility as they can shoulder. The instructor himself must be interested and willing to put in extra hours planning the work, and looking after the ordering and other things that cannot be left to boys.

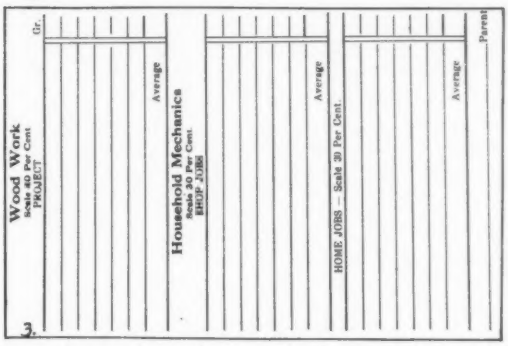
KEEP TAB ON SHOPS

Mr. Guy Stants of the Gerstmeyer Technical High School, Terre Haute, Indiana, has designed two very interesting cards for keeping tab on the work done by students in the household mechanics shops. One of the vocational courses offered in the Gerstmeyer Technical High School is devoted entirely to household mechanics, and it is expected that students will perform some of the work at home as well as in the school shop. To determine the value of this work, a student uses card No. 1, which he takes home and fills in with the aid of the parent. On the reverse side of the card is the following message:

To Parent: In order to encourage the boys to use their mechanical skill in doing jobs about the home, we are giving credit for that work, provided that it is attested by the parent. In this way we hope to bring


Home Job..... School
Scale 30 per cent.
Parents' Estimate of Cash Value
Date | Job completed | Parent
Total Cash Value
1.
"A Dollar Saved is a Dollar Earned"


STUDENT MATERIAL CARD
Department of Vocational Education
TERRE HAUTE PUBLIC SCHOOLS
School
Name Date Class
MATERIAL USED
Fee 10
Received Payment
GUY STANTZ, Director of Vocational Education
Term Grade Teacher
2.


Gr.
Wood Work
Scale 40 Per Cent
PROJECT
Average
Household Mechanics
Scale 30 Per Cent
SHOP JOBS
Average
HOME JOBS — Scale 30 Per Cent.
Average
Parent
3.

about a closer relation between the home, the boy, and the school.

Your cooperation in this matter will be greatly appreciated.

Please list the jobs on the back of this card and sign at the right.

Guy Stantz, Director of Vocational Education

Teacher.....

Card No. 2 is used as a record of the material used by the student and of the payments which he makes for the same. The reverse of the card (No. 3) is a record of the actual projects which the student undertakes and of the grades which he is given for the work.

PERSONAL NEWS

Mr. Harvey L. Freeland has been appointed state supervisor of trade and industrial education for Nebraska. Mr. Freeland succeeds L. A. Hartley, who has become educational director of the National Founders' Association.

Mr. Freeland has been state director of trade and industrial education in Iowa for the past four years. He has received degrees from the University of Illinois and from the University of Minnesota.

Mr. Arthur F. Payne has become Director of Educational Service on the private staff of Curtis, Fosdick & Belknap. During the past year Mr. Payne was professor of industrial education at Teachers College, Columbia University.

Huger Elliott, principal of the school of Industrial Art, of the Pennsylvania Museum, has resigned to become head of the new department of education of the Metropolitan Museum of Art, New York City.

The honorary degree of Doctor of Science in industrial education has been conferred by the Stout Institute, Menomonie, upon Mr. R. L. Cooley, superintendent of the Vocational School, Milwaukee, and upon Mr. C. A. Prosser, director of Dunwoody Institute, Minneapolis. The degrees were conferred in each case for pre-eminent service in the cause of vocational education in the United States.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

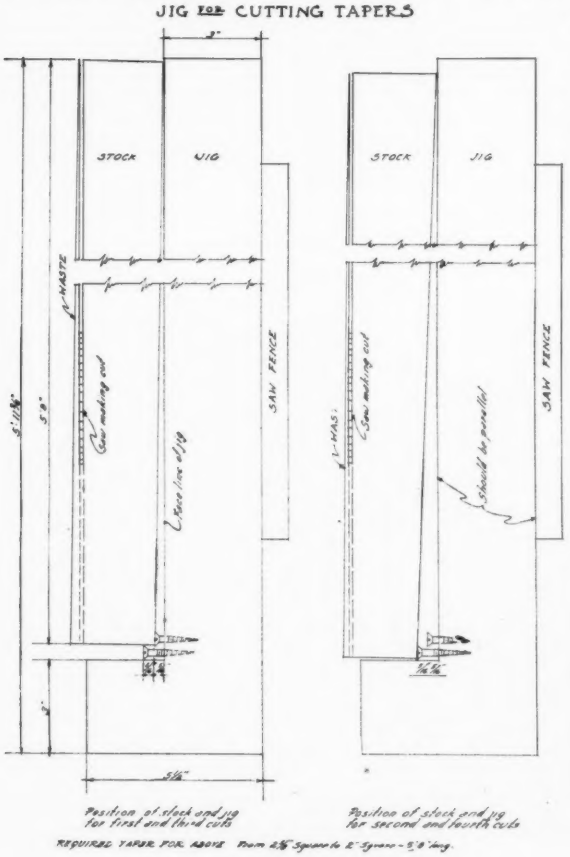
TAPERING STOCK

W. J. Groschke, Academy High School, Erie, Pa.

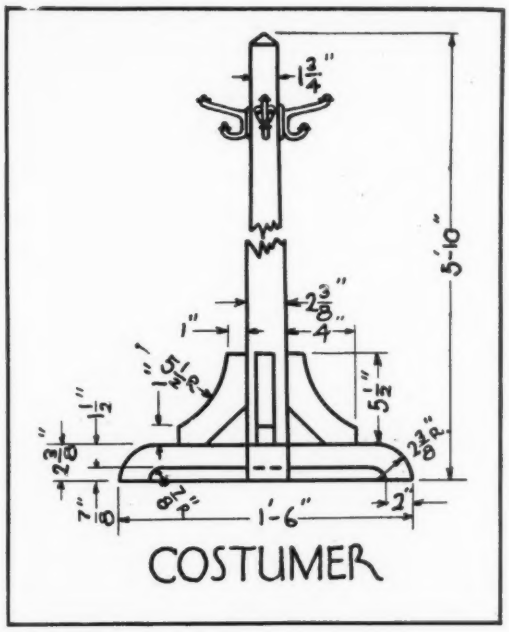
In cabinet making and prevocational woodworking classes, projects such as costumers, taborets, and other small pieces of furniture frequently require a taper on the legs. The operation of making perfect tapers on woodworking machines without the aid of jigs is very difficult. The use of jigs for taper on the jointer are most unsatisfactory, because the stock to be tapered is either too long, or the amount to be taken off is too great for one cut.

The accompanying illustration shows a set up for sawing a tapered post for a costumer. The post tapers from 2⅜″ thickness at the bottom to 1¾″ thickness at the top, a difference of ⅝″, or a taper of 5/16″ on each side.

To adjust the tapering jig to the correct position, set the adjusting screw for the first cut to 5/16″. This represents the amount of taper required. Next set the second cut adjusting screw 5/16″ farther than the first cut,


JIG FOR CUTTING TAPERS
STOCK
JIG
SAW FENCE
Position of stock and jig for first and third cuts
Position of stock and jig for second and fourth cuts

DETAILS OF JIG FOR CUTTING TAPERS.



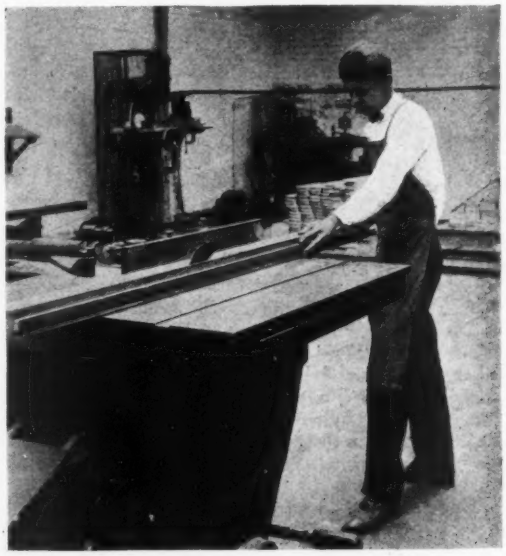
DETAILS OF THE COSTUMER DESCRIBED.

or a total of ⅝″, which represents the relative difference in sizes of the top and bottom of the post.

The next operation is to set the saw fence. Allowing ⅛″ on each side for a jointer cut, the full size of the post at the bottom must be 2⅝″ by 2⅝″. This measurement plus the width of the jig (3″) is the required distance allowed between the saw fence and the saw.

To operate the jig, place the stock resting on the adjusting screw for the first cut. The saw cut parallel to the fence so that it is readily seen that we have the first taper. For the next cut turn the stock over, placing the side just sawn on the second cut adjusting screw. This gives the required taper to the post. Proceed to cut the opposite sides in the same manner.

A slight variation in the second and fourth tapers may be encountered by bringing the stock to the heel of



STUDENT IN CABINET MAKING OPERATING JIG AT THE BOSTON TRADE SCHOOL.

the jig, but on a long taper it is so little that it will not be detected. For cutting tapers on short stock, this difference can be overcome by setting the second cut adjusting screw in a trifle.

This is an all-purpose tapering jig, and may be adjusted to any size or length taper that a cabinet making or woodworking student may be called upon to do.

The costumer is one of the numerous objects of "Erie Standard School Furniture" designed by Mr. W. W. Meyers, supervising school architect, and the product of the cabinet making trade class at Academy high school.

MATCH SAFE

Thomas F. Gocgerty, Pontiac, Ill.

This match safe makes an interesting project for the bench and forge. Figure 1 illustrates the wall plate. The stock should be 16 gauge soft steel. It should be hammered a little on one side to destroy its smooth finish. It is well to use a flat faced hammer and not the ball end of the hammer. Sketch the outline and the open work on a piece of paper, then place carbon paper on the iron and trace the sketch on the metal. It may be well to paint the iron with Chinese White before tracing. Trace all of the lines on the metal with a narrow chisel, then cut out the design and the open work. The scratching surface is produced by cutting diagonal lines with the chisel. After the design has been completed the edges are filed and hammered.

The front and sides of the box in Figure 2 are made of 20 gauge soft steel. The sheet is cut, hammered on one side, filed at the edges, and bent to shape in a vise. The bending is done over a square piece of iron of the right size.

The bottom is also of 20 gauge metal and is bent over an iron block. The part which is bent projects down, not up. The bottom is fitted inside the front and sides.

All the holes for fastening the box are drilled and then riveted with No. 12 round-head rivets. The box can be decorated by cutting lines or using the set punches.

When finished, heat the whole to a dark red. After it has cooled, clean the high places with emery, and coat the whole box with a mixture of turpentine (90 per cent) and varnish (10 per cent). Rub the finish on with a rag and wipe very nearly dry.

THE RAKE FOR RAKE KNITTING AS A MANUAL TRAINING PROJECT

Bertha Thompson, Director of Hospital Occupations, Woodstock, N. Y.

You have doubtless heard of the rake knitting, so popular among the ex-soldiers in the government hospitals. This knitting is becoming almost as popular in civilian hospitals and sanatoria, and as a diversional occupation for sick people at home. In the government hospitals there was usually a woodworking shop where the patients made the rakes they needed. Sometimes the hospital carpenter made up a supply in his spare time. But civilian hospitals and sanatoria, and patients being cared for at home, experienced difficulty in getting rakes made. Very often the right kind of lumber is not available in small communities.

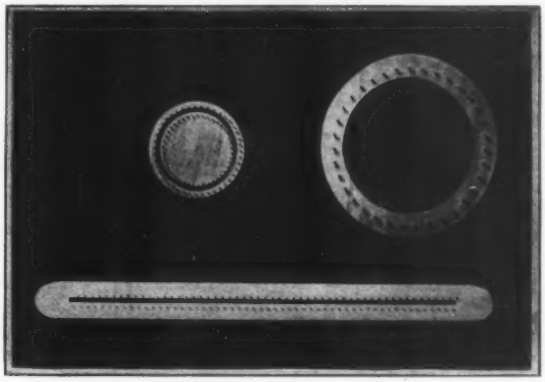
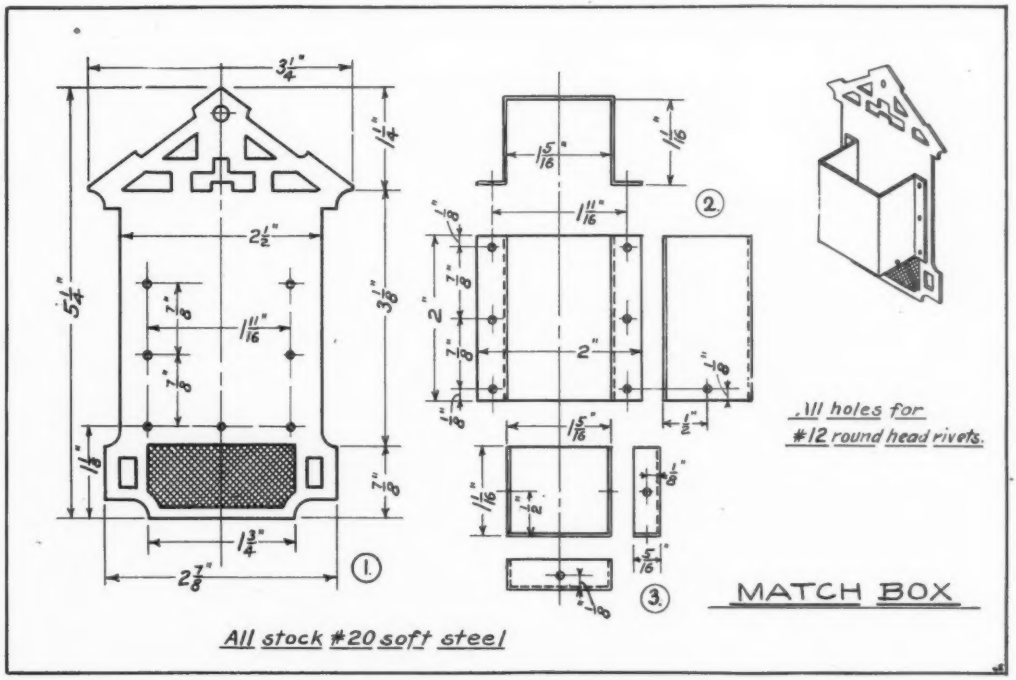


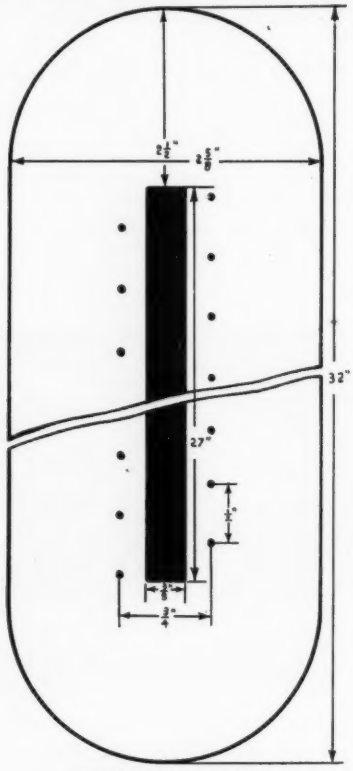
FIG. 1.

This rake would make a very good project for elementary manual training classes. To make it requires



DETAILS OF MATCH BOX.

only simple sawing, planing, and finishing, and accuracy in measurement and in the placing of the nails. If manual training classes here and there would make these rakes and let us know through the columns of The Industrial Arts Magazine where we could obtain them, it would be a very great help indeed. In the hope that some teachers will be interested in this project, I will add a description of the rake and the dimensions most commonly used:



DETAILS OF A RAKE.

DIMENSIONS: Length, 32"; width, 2⅝"; thickness, ¾" to ⅞". Opening down the center (black) 27" long and ⅜" wide.
SETTING OF NAILS: Rake No. 1, nails ½" apart in rows ¾" apart, set as in drawing. Rake No. 2, nails ⅜" apart in rows ¾" apart. Rake No. 3, nails ¾" apart in rows ⅝" apart. Rake No. 4, nails $\frac{5}{16}$" apart in rows 10/16" apart.

Fig. 1 is a photograph of a finished rake. Fig. 2 will serve as a key to the various dimensions.

Short rakes with the same setting of nails are useful for knitting collars, pockets and belts.

Yellow poplar or red gum makes a rake that is light to handle, and holds the nails securely. Select well-seasoned lumber, free from knots, about ¾" to ⅞" thick. Rakes made from thinner wood give in the middle and spoil the knitting.

The rakes must be well-planed and sandpapered, and no roughness left anywhere to catch the wool when knitting. Special care must be taken in finishing the opening within the rake.

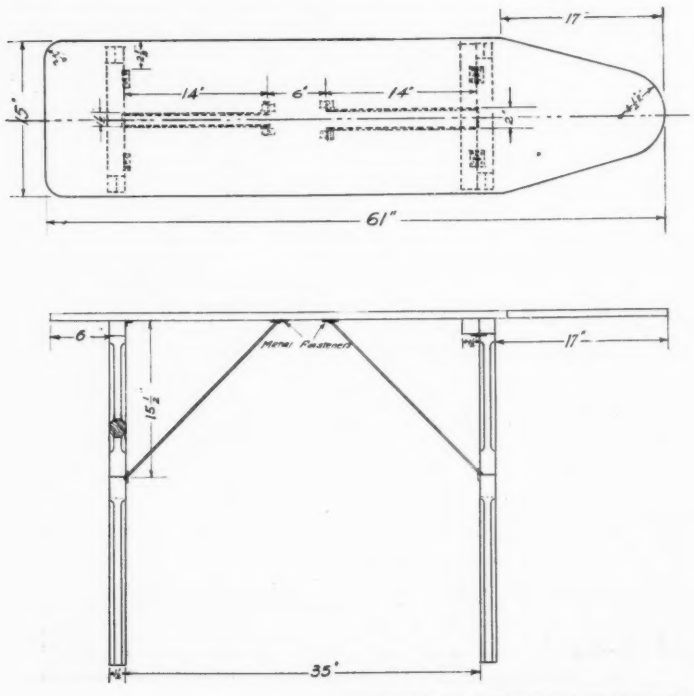
A FOLDING IRONING BOARD

A. V. Larson, Columbus, Nebr.

The folding ironing board illustrated in the drawing makes a suitable eighth or ninth grade woodworking project. There is nothing especially difficult in the construction of the project, unless it may be the half-lap and cross-lap joints. This board is light in weight, folds compactly, and is very rigid when set up.

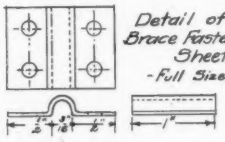
The wire braces should be made of steel and may be readily formed to shape by heating slightly in a gas flame. If steel wire is not obtainable, ordinary No. 6 wire will answer the purpose. One loop should be made slightly smaller than the other so that they will fold properly. The looped end is fitted into a notch, cut into the legs at their intersection. These loops are secured by small turn buttons.

It will be noted that one pair of legs is hinged directly on to the board, and the other pair is hinged on to a cross member screwed on to the board.

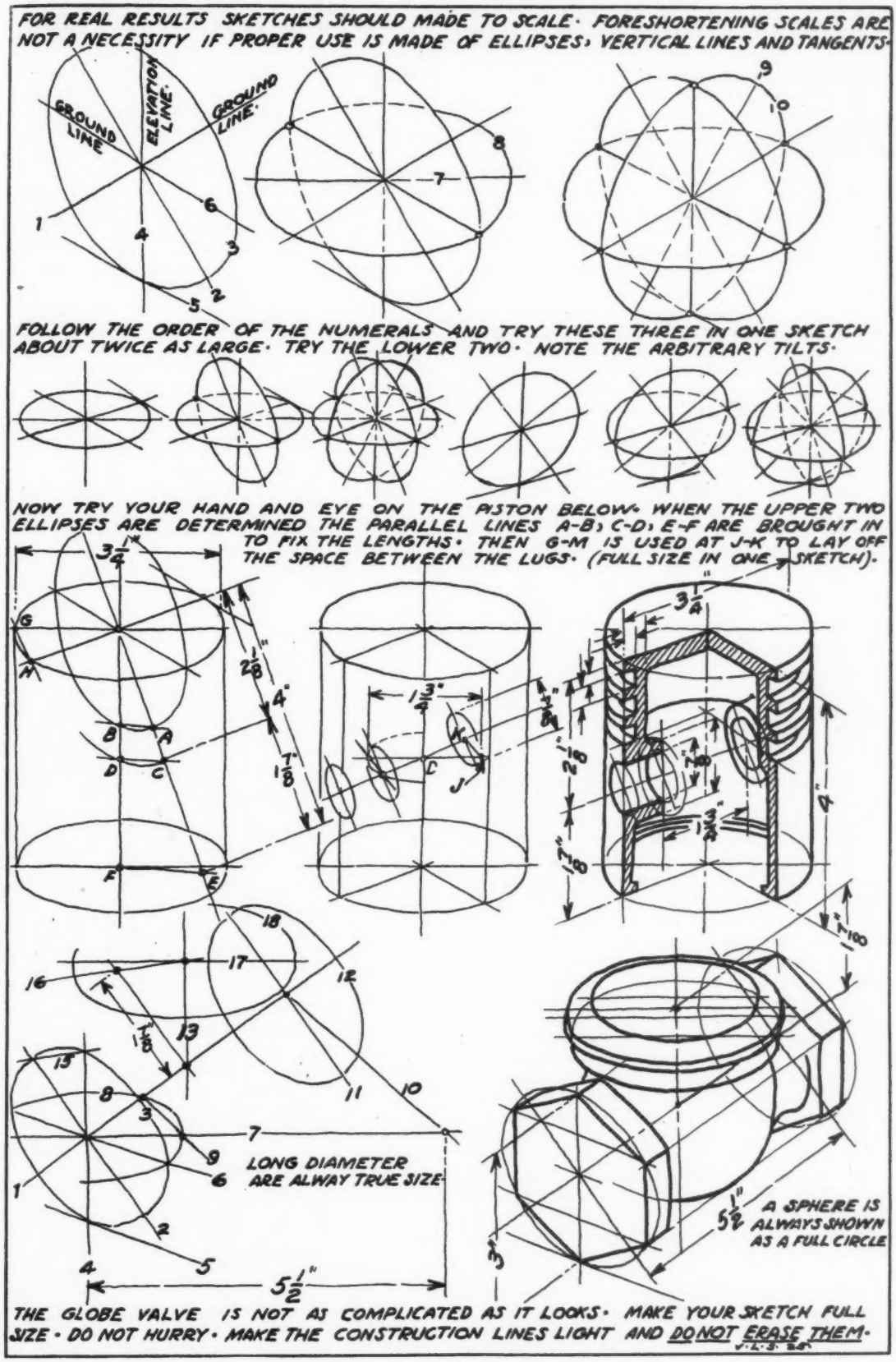


~ Bill of Material ~

Pieces	Material	Dimensions
1	Pine	¾ × 15" × 64"
4	Oak	1½ × 1½ × 37"
3	Pine	1½ × 1½ × 13½"
2	Steel Wire #6 - 36" long.	
2 pr.	Butt Hinges - 1½".	
4 pcs.	Metal 1 × 1½"	#18



DETAILS OF A FOLDING IRONING BOARD.


FOR REAL RESULTS SKETCHES SHOULD MADE TO SCALE· FORESHORTENING SCALES ARE NOT A NECESSITY IF PROPER USE IS MADE OF ELLIPSES› VERTICAL LINES AND TANGENTS·
GROUND LINE
ELEVATION LINE
GROUND LINE
FOLLOW THE ORDER OF THE NUMERALS AND TRY THESE THREE IN ONE SKETCH ABOUT TWICE AS LARGE· TRY THE LOWER TWO· NOTE THE ARBITRARY TILTS·
NOW TRY YOUR HAND AND EYE ON THE PISTON BELOW· WHEN THE UPPER TWO ELLIPSES ARE DETERMINED THE PARALLEL LINES A-B› C-D› E-F ARE BROUGHT IN TO FIX THE LENGTHS· THEN G-M IS USED AT J-K TO LAY OFF THE SPACE BETWEEN THE LUGS· (FULL SIZE IN ONE SKETCH).
LONG DIAMETER ARE ALWAY TRUE SIZE
A SPHERE IS ALWAYS SHOWN AS A FULL CIRCLE
THE GLOBE VALVE IS NOT AS COMPLICATED AS IT LOOKS· MAKE YOUR SKETCH FULL SIZE· DO NOT HURRY· MAKE THE CONSTRUCTION LINES LIGHT AND DO NOT ERASE THEM·
V. L. S. '25

A SUGGESTIVE PLATE OF PROBLEMS IN TRUE PERSPECTIVE.
Prepared by Prof. V. L. Sherman, Lewis Institute, Chicago, Ill.
This is the third of a series of six helpful plates for teaching true perspective in a simple, direct manner.

The Composition of Business Stationery Forms

Robert F. Salade

BUSINESS stationery is a line of work that is being produced by the average printing firm on a profitable basis. It is a very popular line which knows no special seasons; for practically every business house is in need of something in this line at frequent intervals. Numerous printing firms are specializing in all kinds of business stationery and several of these have made such a success of it that they receive orders from many different parts of the country.

So much for the business side of the subject. Enough has been said to indicate the fact that this is one of the most important lines in the commercial printing trade. While it is true that in these days a great deal of business stationery is being produced by the intaglio engraving method, stone lithography, and by the offset printing process, the fact remains that the vast majority of orders for this line are being turned out by the typographic printing method.

This article will be devoted to the subject of good typography as applied to all kinds of business stationery. The average "job" compositor is capable of designing and setting up original typographic forms of this class, but numerous compositors have become highly proficient in this work through having made a particular study of it. At first thought, it may seem to be rather a simple class of work, but when given careful consideration it will be seen that such work really demands experience and artistic taste on the part of the typographer.

The complete line of business stationery consists of letterheads, note sheets, billheads, statements and envelopes. Business cards may also be included in this line. Other kinds of printed matter, which are known as office or business stationery, are as follows: Statement folders for banks, physicians' prescription blanks, and appointment cards used by doctors and dentists. It should be understood that printed prescription blanks are not only used by doctors, but are likewise used by dentists, opticians, and other professional folks who are authorized to write prescriptions. Bankers, trust companies, insurance and legal firms often use special office stationery, in addition to the regular forms of letterheads, note sheets, statements and envelopes.

Every professional man or woman, as well as every business firm, needs office stationery, but it goes without saying that the same style of letterheads, envelopes, and so forth, will not serve for all cases. For example, the doctor, lawyer, dentist, or banker can only use the plain, dignified style of stationery which will express the high character of his profession in just the right way. On the other hand, the proprietor of a fancy goods store can, with all appropriateness, use stationery of the elaborate variety. Many business firms may use stationery printed in two or more colors, while others would not find color printing suitable.

The modern tendency in practically all lines of business is to have business stationery rather plain in appearance. In cases where a form of type is printed in colors, only a touch or two of bright color is applied. The plan of printing stationery in two or three warm colors, so popular a few years ago, is no longer being followed to any extent. Of course, there are exceptions to this rule. In the greater number of cases, however, stationery is now being printed in a single color and the typography is plain but beautiful.

It is safe to say that the average letterhead, notesheet, envelope, or business card will look better printed in black ink, than printed in green, brown, blue or some other single color. Next to black ink the bronze-blue color would be the most pleasing. Nevertheless, a large number of stationery forms are printed in a bright blue and it is only fair to state that many of these look well. The bright blue color is preferred by numerous business firms, and also by a considerable number of professional people. One well-known firm of architects insists that all of its office stationery be printed in a standard shade of dark brown. A prominent florist will have nothing but stationery printed in two colors—dark green and bright red. One manufacturing company, for many years, has been using a complete set of stationery printed in black and orange. The customer's wishes must always be satisfied. In cases where color printing is desired by the customer, the only thing that the printer can do is to handle the order accordingly.

The production of handsome business stationery depends a great deal upon the proper selection of type. Certain faces of type are particularly adapted to stationery forms, while many other faces are not. Among the type-faces which are appropriate for the general run of stationery are the following: Caslon Old Style, Bodoni Book, Goudy Old Style, Garamond, Litho Roman, Cloister Old Style, Blair Series, Engravers' Roman, Mercantile, Copperplate Gothic, Bulfinch Old Style and Engravers' Bold. These are merely a few of the most favorably-known faces and many others could be mentioned, but those which have been named are suitable for the average job.

Some of the faces which have been named, however, are very appropriate for the kinds of office stationery used by commercial firms, while some are more correctly suited to stationery for doctors, lawyers, dentists, and others of the professional class. For example, the Goudy Old Style in complete series is excellent for such lines of business as a high-class specialty shop, building and contracting, textile manufacturing and custom tailoring. The Caslon Old Style and the Bodoni Book would also do for these lines. But, when it comes to stationery for a doctor, a lawyer or a dentist, faces like Engravers' Roman, Copperplate Gothic and Litho Roman can be employed to the best advantage.

By making a careful choice of type-face, the business stationery can be designed to *express* the profession or business for which the stationery is used. A bold gothic face, for instance, may be employed to express the coal or iron business. The proper use of a French script will suggest the dainty character of a French millinery shop. The letterhead for a clergyman would bring thoughts of the church if set up in Old English or Cloister Black. These are merely a few examples. The typographer can compose a form for every occasion that will present just the right appearance for the occasion.

What could be more appropriate for an architect's stationery than the classical Della Robbia type? The design of these letters seems to suggest beautiful architecture at a glance. What could be more suitable for a bank's stationery than Engravers' Bold? The artistic cut of the Bulfinch Old Style type is admirable for a jeweler's stationery, and the very design of this type seems to repeat the word "jewelry."

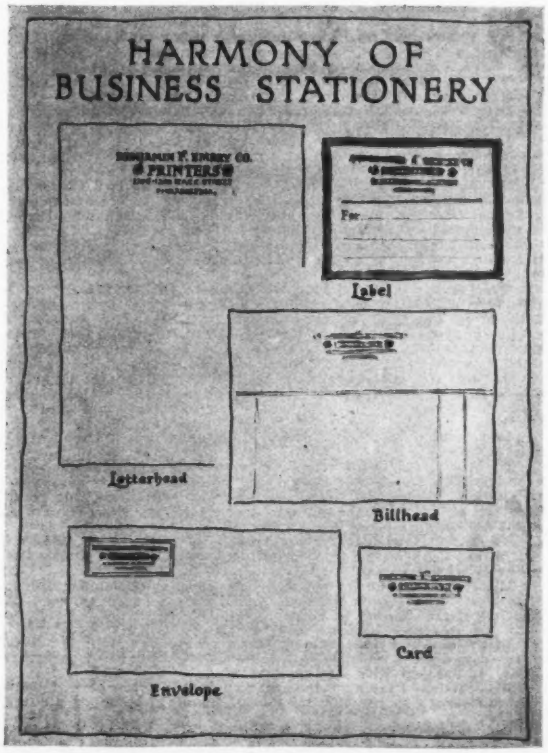
Unfortunately, however, not every printing establishment is equipped with a wide range of type-faces to provide for the composition of correct forms for every occasion, and where there is only a limited assortment of

A BUSINESS CARD IN THE RIGHT STYLE OF TYPOGRAPHY FOR A BANKING FIRM. COMPOSITION IN CARD LIGHT LITHO SERIES.

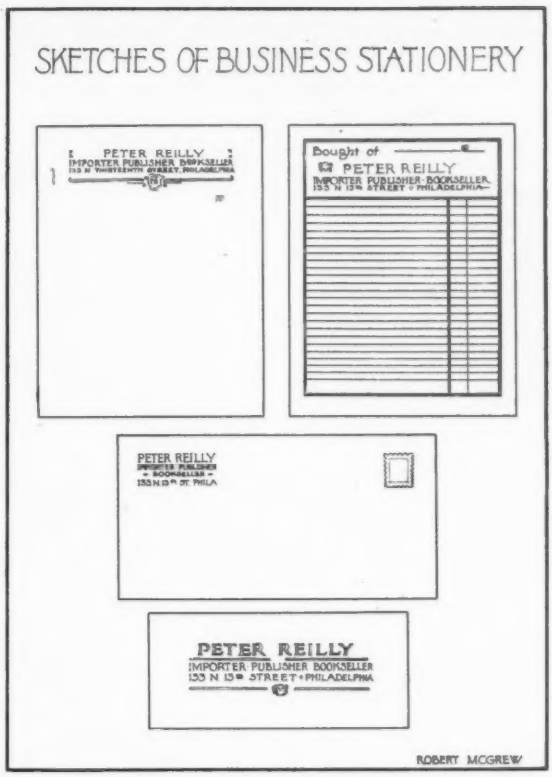
types the compositor will have to make the best selection possible for each job.

To obtain the most satisfactory results in the composition of stationery forms, the typographer should first procure a sheet of the stock which is to be printed. This sheet should be of the exact size intended for the job. A rough typographical layout for the form should then be penciled in approximately the right position on the sheet. A carefully "hand-lettered" sketch is not essential, the idea being to merely pencil lines or characters indicating the general arrangement of the form as it would appear when completed. This work need not require more than five minutes in the average case, but a good-size piece of copy for a letterhead will naturally call for more attention than ordinary copy for a note-sheet, billhead or envelope.

A rough layout for the form to be set in type is always worth the time and study involved for the reason



LAYOUT SHEET SHOWING HARMONY IN BUSINESS STATIONERY FORMS. PREPARED BY A STUDENT AT THE SCHOOL OF INDUSTRIAL ARTS, PHILADELPHIA. THESE VARIOUS LAYOUTS CALL FOR THE TYPE-MATTER BEING PRINTED IN BRONZE BLUE AND THE ORNAMENTS PRINTED IN RED.

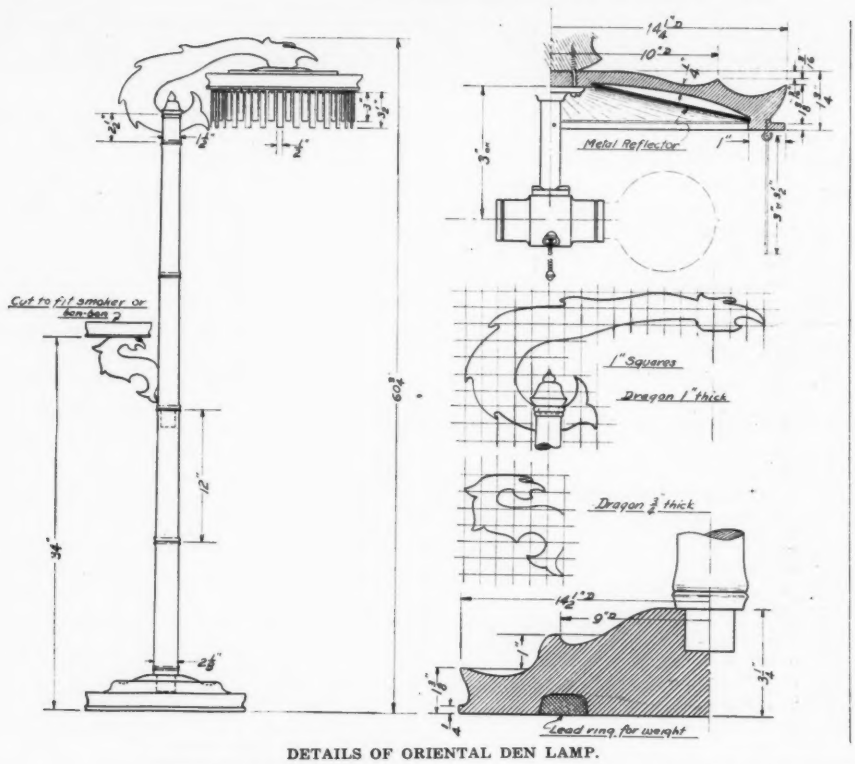


THESE SKETCHES FOR BUSINESS STATIONERY FORMS SHOW RELATIONSHIP BETWEEN THE VARIOUS FORMS. PREPARED BY ROBERT McGREW AT THE SCHOOL OF INDUSTRIAL ART, PHILADELPHIA.

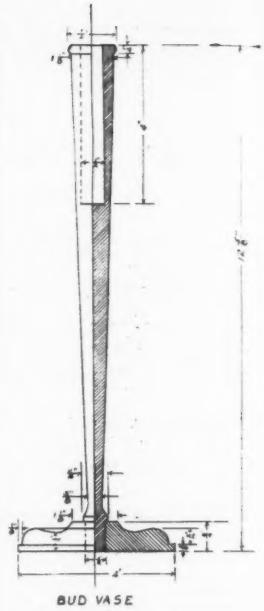
that it will not only predetermine the typographical arrangement, but it also is the means of saving time in the actual work of composition. The layout plan is especially recommended for forms to be printed in two or more colors, and in some cases two or three layouts of different arrangement may be necessary to produce one that will be best fitted to the subject. Letterhead forms deserve more consideration than the other kinds of stationery forms, but there are times when even an envelope corner card will be hard to set without the aid of a layout.

An order is often placed with a printer for a complete series of business stationery—letterheads, note-sheets, billheads, statements and envelopes. A new firm usually places an order of this extent, but numerous firms in business for long periods will also place such orders, and there are occasions where a firm removes to another location and thus needs an entirely new supply of office stationery. These points are mentioned for the purpose of illustrating the importance of having a complete set of business stationery all printed in the same style of typography. In other words, there should be a close relationship in the typographical style between all the various pieces of a firm's stationery. For example, if the firm's letterhead has been composed in Caslon Old Style type, the note-sheet, billhead, statement and envelope forms for the same firm should be set in Caslon Old Style. Moreover, the typographical arrangement of each form should be much the same. Here layouts can be utilized to great advantage. By means of roughly-drawn sketches the compositor can design typographical treatment for a complete set of stationery which will show a distinct relationship between letterhead, note-sheet, billhead, statement and envelope.

(To Be Concluded)



DETAILS OF ORIENTAL DEN LAMP.



DETAILS OF BUD VASE.

ORIENTAL DEN LAMP

Wm. M. Schaefer, Alton, Illinois

The lamp shown in the accompanying drawing, which some have termed a Mah Jongg lamp because of its Chinese style, offers an excellent problem to develop skill and stimulate interest in advanced shop-work.

The shade offers the most difficult problem but can be made with minimum difficulty if attached to a single-screw face plate with a bolt while turning the inside. This is then carefully chucked over a disc of soft wood for the balance of the turning and finishing. The large dragon is built up of half-inch stock having a gouged groove for concealed wiring. All wood parts constructed of curly maple, finished natural, and beautified by a filler of silex, yellow ochre and chrome yellow, and finished with a pale varnish rubbed to a high gloss. A study of the bamboo joint will help considerably in the imitation, and the effect can be made more realistic by burning at the joints with another piece of wood while the piece is turning in the lathe. The reflector must be carefully developed and sprung into place, after which it should be neatly soldered and polished or enameled. The spangles or drape permits of originality and taste. If facilities permit, they may be made of amber colored glass. However, this was impossible in the writer's shop and a substitute was made as follows: Strips of celluloid were obtained from Frederick Post Company and cut into the desired lengths; these were drilled, suspended on strings, and dipped in pure orange shellac. Repeated dipping will deposit a thick coat which will check in time producing a crazed glass effect. No. 217½ brass screw eyes may be used to attach the spangles. A drape of silk fringe, parchment, or what-not behind the spangles will subdue the light and add to the effect.

A BUD VASE

R. L. Wilson, Keokuk, Iowa

A bud vase is always an interesting problem and makes an ornamental piece for the home. The present design involves a large number of typical turning operations, and is at the same time simple enough for any boy to undertake.

Mr. Ferdinand A. P. Fischer of Chicago, Ill., was married June 29th to Miss Rosamond Wendell, of Lockport, N. Y.

Mr. Charles A. Hart of Milwaukee, Wis., has been appointed itinerant instructor in painting and decorating for the vocational schools of Fond du Lac, Madison, Racine, and Kenosha.

Mr. Charles H. Whittemore, printing instructor at the Albany Vocational School, Albany, N. Y., has resigned.

Miss Priscilla Cunningham has been elected president of the Arts Guild at Williamsport, Pa. Miss Cunningham is a graduate of the Philadelphia School of Industrial Art and is at present supervisor of the commercial art department of Williamsport Dickinson Seminary.

Mr. Frank H. Arnold, principal of the Lewis and Clark high school at Spokane, Wash., has been placed in charge of the part-time, attendance, vocational, extension and evening-school work of the schools. Mr. Arnold will have his offices in the administration building and will devote his entire time to the night school and allied work, also giving some time to the supervision of penmanship in the schools.

Mr. Jacob Zuber, for 32 years manual training teacher at the Mechanic Arts High School, St. Paul, Minn., has been signally honored in having the first issue of the "Mechanic Arts M," a school paper, dedicated to himself. On July 23rd Mr. Zuber attained his eightieth birthday, so that he is easily the oldest teacher in the service of the St. Paul schools.

During his 32 years of service at the Mechanic Arts high school, Mr. Zuber has never been absent or tardy, which coupled with his unusual age, constitutes a record which can hardly be equalled.

The faculty of the school gave a dinner in his honor at the building.

Mr. W. J. Breit, for seven years superintendent of schools at Arkadelphia, Ark., has accepted the position of state supervisor of civilian vocational rehabilitation. He will have his headquarters at Little Rock and will work jointly with the national and state organizations.

Mr. H. W. Roberts, former vocational director at Anderson, Ind., has accepted a position as director of personnel at the Olds Motor Works, Lansing, Mich.

Miss Minnie Horn, head of the girls' department of the Stevens Point (Wis.) vocational school, has acepted an academic position at the Janesville vocational school.

Miss Genevieve Cartmill of Plover, Wis., has been appointed home economics instructor at the Stevens Point (Wis.) vocational school, to succeed Miss Evelyn Braatz.

Miss Helen Perrin has been appointed a teacher of home economics work in the city schools of Lansing, Mich., at a salary of $2,500.

Mr. Harry Gay, teacher of manual arts in the Waterbury, Conn., schools, for the last ten years, has been appointed specialist in woodwork in the Junior Achievement Bureau, Springfield, Mass. The Bureau conducts club work in industrial and home-making enterprises for girls and boys, cooperating with schools and other local juvenile institutions. Mr. Gay is a graduate of the Fitchburg Normal School, and has taught at Beverly and Waterbury since graduation.

L. H. DENNIS BECOMES DEPUTY SUPERINTENDENT

Mr. L. H. Dennis has been appointed deputy superintendent of public instruction, with a major assignment in the field of vocational education for the state of Pennsylvania.

Mr. Dennis was graduated from the Bloomsburg Normal School and from the Pennsylvania State College. He completed his graduate work at Cornell University, Bucknell University, and at Teachers College, Columbia University.

L. H. DENNIS,
Deputy Superintendent,
Harrisburg, Pa.

For ten years, Mr. Dennis served as a teacher and principal in the public schools, and taught for two years at the Pennsylvania State College. He has been director of the bureau of vocational education in Pennsylvania for five years, and has been in state service in an administrative capacity more than thirteen years.

In 1924 and 1925 Mr. Dennis served as a member of the Pennsylvania Rural Education Commission. His services to public education have been recognized in many ways. In 1922 he was elected president of the National Association of State Directors of Vocational Education, and in 1923 became president of the Department of Vocational Education and Practical Arts of the National Education Association. During the same year he was also elected president of the National Society for Vocational Education, and in 1924 was re-elected for a second term.

F. T. STRUCK,
Assistant Director Vocational Education,
State Department of Public Instruction,
Harrisburg, Pa.

DR. STRUCK SUCCEEDS MR. DENNIS

The Pennsylvania Department of Public Instruction has announced the promotion of Dr. F. T. Struck to the position of Director of the Bureau of Vocational Education, succeeding Mr. L. H. Dennis.

Dr. Struck is a graduate of the high school of Hood River, Ore., and the University of Oregon, and has recevied degrees from Teachers College, New York City. He gained some experience as a draftsman in engineers' and architects' offices and spent sixteen years as a teacher, supervisor and administrator in vocational and practical arts education.

Prior to his coming to the Pennsylvania Department in 1920, he held a professorship at the State College. While there, he contributed some original material in the field of farm shop work and shortly afterwards issued his book on "Construction and Repair Work for the Farm."

As a member of the state department, Dr. Struck became familiar with many of the problems in vocational education. He has been instrumental in making important contacts with employees in industry which have helped to bring about desirable relationships between industry and the schools. His vocational experience and training, and his knowledge of Pennsylvania conditions, will be a distinct asset to him in performing efficient service in the position to which he has been advanced.

KANSAS VOCATIONAL CONFERENCE

The third state vocational conference of Kansas opened June 10th at the Kansas State Teachers' College, Pittsburg. The conference called together teachers of manual arts, domestic arts and sciences, and trade courses to learn the newest developments in the vocational field.

Many prominent educators were present and gave talks, among them Dr. C. A. Prosser, Dunwoody Institute, Minneapolis, Minn.; F. T. Struck, director of vocational education in Pennsylvania; C. M. Miller, director of vocational education for Kansas; Miss Mary Sweeney, Merrill-Palmer School of Homemaking, Detroit, and Lewis Gustafson, president of the vocational educational association of the middle west.

Brief talks were given on the subject of Progress in Vocational Education, with President W. A. Brandenburg presiding. Mr. C. L. Klinefelter, federal agent of the vocational board, spoke on the subject Cultural Educational and Economic Efficiency. Dr. C. A. Prosser, in his address, declared the situation in which we find vocational education today is a tribute to the idealism of the people of Kansas. Other guests included I. B. Morgan, director of extension work in Kansas City, Kans., and director of the night schools of the city, and Lewis Gustafson, president of the vocational association of the middle west.

The second day of the conference opened with a round table on the general topic, Promoting Evening Schools and How to Start, with Laurence Parker presiding. Various educators of the state were present to give their experiences and ideas and the talks were finally summed up by Mr. Lewis Gustafson and Dr. C. A. Prosser.

Mr. J. V. Hamilton, director of industrial education at Chanute, declared manual training is not truly vocational education because laymen do not recognize it as such. A boy leaving school, he said, is thrown on his own resources and his opportunities for education generally are not good. Here is the opportunity for the educational engineer to do service. The boy can enter night school and with aid and cooperation can determine what he most needs to fit himself for his particular job.

Mr. Laurence Parker pointed out that it often occurs that the manual training teacher does not know a single manufacturer in the community. The educational engineer becomes acquainted with the various concerns and works with them. Get acquainted with your community, he said, and you will have covered the first essential step in the organization of successful evening school work.

Supt. J. B. Heffelfinger, Newton, talked on the topic, Newspaper Publicity as a Means of Arousing Community Interest in Education. The newspaper is not only a helpful way of conveying information to the people, but arouses interest and wins the cooperation of the community. Newspaper campaigns are generally successful and articles from the instructor are valuable. Articles telling of the work being done and things to be accomplished all tend to stimulate genuine interest in the efforts of the night school.

Prof. J. A. Yates of Pittsburg, took up the topic, Bringing the Union Men and the Employer Together. He pointed out that vocational education in the form of night schools is a valuable means of getting the two factions together. Get them to think about things they agree about, said Dr. Yates. Arrange for commencements for those who have finished the course provided in the vocational school, then invite the employer, and try to arouse the sympathy of the administration.

Mr. I. B. Morgan gave a short talk on newspaper publicity as he found it in Kansas City. Newspapers appreciate school news and advertise the school by giving personal interest and short human interest stories. Another method of advertising is to place posters, circulars and stickers in automobiles and street cars.

Dr. C. A. Prosser, who presented the closing remarks of the conference, declared that no school or class can succeed where there is separation in the class with regard to race, position or wealth. Night schools are not organized for the purpose of gossip, or for the discussion of theories or for the education of those interested.

NEW BOOKS

Everyday Art

By Ami Mali Hicks. Cloth, 241 pages, illustrated. Price, $3. E. P. Dutton Co., New York City.

This book has for its purpose the advancement of art in dress, house furnishings, domestic buildings, and the thousand-and-one things which surround us in everyday life. It is addressed to the average woman reader rather than the teacher, the student, or even the average man, and it is quite broad and inclusive in its discussions and recommendations.

The chief value of the book is in the chapters on color as related to dress, furniture and interior decoration—a field in which the author is entirely at home. The chief fault of the book is the constant philosophizing on all sorts of topics more or less connected with the main subject. Perhaps we should forgive even this if it were more often correct and distracted less from specifically helpful advice on everyday art matters.

Pueblo Pottery Making

Carl E. Guthe. Cloth, Quarto, 100 pages. Price, $5. Yale University Press, New Haven, Conn.

This book presents a detailed technical study of Pottery Making as carried on by Pueblo Indians at the village of Idiefonso in Arizona. The student of archaeology will find the introduction a valuable discussion of the significance of pottery as a means of studying early culture on the North American continent; he will find the body of the book a most interesting description of the present day art and industry of kindly, agricultural folks. The potter will find in the book a clear explanation of the Indian method of preparing raw materials, moulding, slipping, drying, firing, and painting—and he will find many methods quite as ingenious as those of the maker of factory pottery. Finally, the artist will find in the book useful suggestions for pottery shapes, decorative designs, and simple ornament. The publication is the second separate paper of the South Western Expedition of Phillips Andover Academy, Department of Archaeology.

Partrick Industrial Arts Tests

By Charles D. Partrick. Paper, 7x10¾". Published by the Author, 44 Vista Ave., Elizabeth, N. J.

This test is of the familiar selection type and provides one hundred questions intended to measure the information which boys possess at the beginning and at the close of a course in grades seven to nine. The questions relate to tools, materials, and processes in woodworking and wood finishing. The test is quite comprehensive and should be useful for class examinations not only in woodworking proper but also in related information.

The Colour Spectrum

By Avenir Le Heart. A Color Chart. Price, $5. Published by Avenir Le Heart, P. O. Box 1322, San Francisco, Calif.

This analysis of the colour spectrum is divided into two parts. Part I is a color wheel consisting of 18 spokes, or hues, each with five values. Part II is a similar color wheel in which the proportions necessary to obtain each of the color hues and values are stated in terms of percentages of the several water or oil colors used. Two mats of black paper are furnished with the chart. These are in dial form and are so arranged that analogous and complementary harmonies can be readily worked out. The author uses yellow, red, and blue as his primary colors. The color chart will be found useful for printers, interior decorators and, in fact, all others who are obliged to work with colors, and who want a quick and convenient method of checking the correctness of their combinations.

Farm Accounting

By Lennes and Merrill. Four pamphlets, 8½"x11". The Macmillan Co., New York.

These books provide complete blanks for the practical laboratory work called for in Currier, Lennes, and Merrill's Farm Accounting. Two books are devoted to farm costs, one is an inventory book, one is a ledger for summarizing all the accounts of the farm.

Industrial Arts Notebook

Arranged by Wm. Sambrook. Price, 25 cents. Whitlock's Book Store, New Haven, Conn.

This notebook or tablet contains 26 sheets of ¼" quadrille ruled paper of standard letterhead size. It is intended to be used for making sketches and notes in the woodworking classes of elementary and junior high schools. The compiler has used it for some years in his shops and it is in general use in the schools of New Haven. An interesting feature is a sheet of useful tables concerning tools, metals, pattern making and metals which may be used by students of pattern making and woodworking.

Printing Job Sheets

By C. W. Hague. Set No. 1. Published by the Author at the Stout Institute, Menominie, Wis.

These job sheets for printing are intended to cover elementary composition, and consist of ten trade process sheets and ten job sheets. The process sheets describe in detail the processes of straight typesetting, removing type from the stick, tying type forms, proofing, reading proof, correcting type forms, cleaning type forms, and distributing type. The job sheets provide ten pieces of copy, illustrating typical elementary composition—a paragraph, a poem, a sample tabulation, hanging indentations, the use of initial letters, border lines, double column jobs, setting from typewritten and longhand copies, and a motto card. The job sheets follow the best present-day practice of outlining the specifications, tools, and equipment, and procedure. Test questions and space for a record are provided. The sheets take careful account of the fact that the student as he progresses from his first job onward requires less and less directions in procedure.

The main value of these sheets is to be found in a possibility of independent instruction which the teacher can give with their aid.

LUNCHEON GIVEN TO THOSE ENGAGED IN INDUSTRIAL EDUCATION IN THE STATE OF NEW JERSEY, BY THE EDUCATION DEPARTMENT OF THE AMERICAN TYPE FOUNDERS COMPANY, IN THE PRIVATE DINING ROOM OF THE COMPANY IN JERSEY CITY, SATURDAY, JUNE 13, 1925.

Mr. R. W. Nelson, President of the American Type Founders Company, presided. Mr. F. K. Phillips, Manager of the Education Department of the company, acted as toastmaster. Guest of honor, Mr. Wesley A. O'Leary, Assistant Commissioner of Education for the State of New Jersey, in charge of Industrial Education.

NOW, ARE THERE ANY QUESTIONS?

Replies to questions will be made only when the name and address of the correspondent are stated. Most questions are not of general interest and replies are made by letter.

Automobile Refinishing

Q. 497. I have a Dodge coupe, 1923 model, and I had it refinished last spring, but the paint has checked and cracked terribly bad—to the extent that it is exposing the metal to the rust. The old enamel was not removed by the job painter. I would like to know the best method of refinishing it myself. How to remove the old material now, and in detail, what method to use in giving it a good refinish. Advise me the kind of material to use and the sort of brush.—N. O. R.

A. In the first place I give you full warning that you have a big job ahead of you. In reality, it would take an article of ten thousand words to adequately describe what you need to know in order to overcome your lack of trade knowledge. The all-metal body of the Dodge is covered with a baked enamel coating, a material exceedingly difficult to remove with anything but the sand blast or a stripping tank containing concentrated hot solvent. Your only recourse is to try one or two brands of varnish remover from your local supply houses, until you find one which will effectually remove the new finish and the old. The exceedingly great difference in flexibility between the old and the new coats is largely responsible for the destruction of the latter.

In applying the varnish remover, lay it on in such a manner with a single quick-flowing stroke as to avoid disturbing the paraffine surface of the varnish remover, which tends to force the latter down to the metal and which, if broken up, would permit the solvent to evaporate very rapidly. Allow to remain until the surface is either soft and sludgy, or until it has become covered with a multitude of wrinkles. When in this condition use a three-inch flexible painter's scraper, to peel off the softened finish, placing the removed material on a quarter sheet of newspaper. These squares of newspaper should be thrown in the fire at the end of the day's work, and should not be allowed to remain where they could possibly start spontaneous combustion. The use of a No. 2 or No. 3 steel wool will probably materially aid you in removing the last traces of the old finish. In the refinishing shop or factory, the body would now be cleaned with a rust and grease solvent known as Deoxidine, which you may be able to purchase locally. If not, make up a hot solution of Oakite, which can generally be obtained in hardware stores, using eight ounces per twelve quart pail of boiling water. Apply thoroughly with a fiber scrubbing brush, especially around mouldings and panel lines.

The metal primer, color glaze, putty glaze, and sanding surfacer, can be best purchased from the Dibble Co., of Detroit, color manufacturers. The specifications would be:

Apply a metal primer coat, using a three-inch Fitch flowing brush and following the dilution specifications of the manufacturer. Let dry twelve hours at 75 to 80°. Apply the glazing coat as per manufacturers' directions. Let dry 24 hours at 75 to 100°. Apply two coats of sanding surfacer, allowing twelve hours between coats. Cut down to a smooth, even surface with Minnesota Mining Co.'s, Wet or Dry No. 180, using plenty of water under sandpaper torn to quarter sheet. It is on this coat that the labor of producing a smooth, even surface must be applied. Let dry twelve hours at the maximum temperature available. Smooth up the edge of the flexible three-inch scraper on an oil stone so as to be free from all knicks and rough edges. Use a Dibble putty glaze to glaze all indentations, and so forth, which cannot be bumped out from the inside of the metal.

Allow six hours for putty coat to harden, and water sand as on the sanding surfacer. Apply a color glaze coat, following the directions of the Dibble Co., for the particular color you wish to use. This will require a full-chisel, inch and a half, three-inch extra soft Fitch brush, which has been thoroughly cleaned in turpentine. Let the color coat dry 24 hours at 75 to 100°, and without sanding apply a coat of either Dibble, Beckwith and Chandler, or Pratt and Lambert color varnish. Probably Pratt and Lambert's Effecto color varnish (auto enamel) of the desired shade will be found to be the most satisfactory.

In all varnish work two things are absolutely necessary, good heat and a finishing room well supplied with light and free from dust. The walls should be wiped down with a wet broom and the floor oiled with floor oil at least one hour before varnishing. The latter should never be done in a room which is used for sanding and rubbing operations if it is possible to avoid it.

The color varnish should be applied with a full chisel three-inch and a one and a half inch Fitch brush which has been used for no other purpose. In starting the body, begin on the cowl against the windshield panel moulding, using a free running stroke, carrying enough but not too much stock to allow a stroke clear across the cowl. Complete the latter to the shoulder lines, working as rapidly as possible and brushing the varnish to a minimum extent in order that it may flow out of its own accord. Lay on the two side panels of the cowl with a stroke parallel to the floor. Remove excess varnish from the brush and tip off the fresh work quickly with a light vertical stroke before the color goods has time to set. Brush work must be watched very carefully or brush marks will appear in the finished job.

The tiny particles of dust and lint, which have found their way into the varnish, should now be removed with a small ball of fatty varnish on the end of a light rod, such as a medical applicator, $\frac{1}{4}$" in diameter. The applicator can be purchased by the dozen from a drug store. The fatty varnish can be prepared by heating a very small portion in a varnish can cap over a slow fire, stirring constantly until it is thickened down to the consistency of chewing gum in its plastic state. When a small button of this material is fastened on the end of a rod and shaped to a ball with moistened thumb and finger it offers the best means of quickly removing dust from fresh varnish by tapping the speck with the ball of fatty varnish and withdrawing as quickly and lightly as may be. This allows the new varnish to flow together almost immediately.

The superstructure should now be varnished with the inch and a half brush, carrying down as far as the belt moulding on the body. Complete both side frames of the wheel house; then use the large brush to flow in the large back panel of the superstructure. Watch carefully for sags and drips from excess varnish, but at the same time avoid starving the surface. With the superstructure completed, do both doors, running the moulding line first, and filling in the panel next with the large brush. Start in on the left side of the body if you are left handed, and the right side if you are right handed, in order that you may brush from the raw work to the varnished material. Lay on the goods with a horizontal stroke. Wipe out the brush on the varnish cup, and tip off the work quickly and lightly with a vertical stroke, holding the brush in such a manner that the fingers are about one-half inch from the lowest edge of the tin ferrule. Complete the body and pick carefully with the fatty varnish.

Let dry at least three days in a warm room; then rub with a felt pad, FF pumice stone and water to a fine, true surface free from nibs. Use the hose to flush off with a gentle stream all traces of rubbing dirt, cleaning the corners and mouldings with an unused black China bristle brush. Dry off with a well-washed chamois skin. Before using on this work, the chamois skin should be thoroughly washed out four or five times with warm water and Ivory soap so as to effectually remove all traces of tanner's grease with which the new skins are loaded.

Allow the washed body to dry over night in a warm room and wipe thoroughly with a "tacky cloth" made by wringing out a cheap ten-cent handkerchief, or similar hemmed piece of cloth, in varnish. I find that wringing the cloth out in water as dry as possible and saturating with varnish, then wringing almost dry, tends to make a much better cloth than one which is treated with varnish only. This cloth is now sticky enough to pick up the tiny particles of dust which seem to be inevitable after all rubbing operations.

The second coat of color varnish should now be applied, dried, and rubbed as in the first instance, but allowed a week to dry rather than three days. If Pratt and Lambert's Effecto auto enamel is used, it may not be necessary to use a clear finishing varnish, although I believe that the extra trouble of rubbing the second color coat, even though it be Effecto enamel, gives sufficient added depth in tone to be worth while. The last coat should not be rubbed if reasonably clean, but in case it is full of nibs or dirt, it should be rubbed out and a second clear coat applied.

A word of caution about the brushes and the varnish cups. The brushes should be completely and thoroughly

washed out with pure turpentine after each usage, and between applications they should be suspended in turpentine in such a manner that their bristles are about one inch or more clear of the bottom of the can. A good way to keep brushes is to use a Walter Baker cocoa can. Either solder the joints of the can or seal them with shellac, which is not soluble in turpentine; then bore a hole through the brush handle at the proper distance; insert a wire through the hole and rest the wire on the top edge of the can so that the brush hangs with the turpentine covering the bristles and at least half way up on the tin ferrule. The varnish cups should be washed with the waste turpentine from the brushes and allowed to drain, after rinsing thoroughly. Turn upside down on a clean piece of paper until ready for use. With this little extra care, much extra labor of rubbing will be omitted. While it is manifestedly impossible to overcome the handicap of trade inexperience, yet I feel that this write-up may be of real value to you in enabling you to do a creditable job, especially if you will exercise some pains and patience. Automobile refinishing at best is a tedious operation and, unless one is innured to the vicissitudes of the job, he is apt to think he is undertaking a really strenuous job.—Ralph G. Waring.

Industrial Arts Vocabulary

F. S. Crispin, Philadelphia, Pa.

(Continued from July)

Bond in Brickwork (Arch.)—The arrangement or placing of bricks in a wall so as to tie together the face and backing.

Bore—The internal diameter of a pipe, cylinder, or hole for shafting, whether it be rough or machined.

Boring—The operation of making or finishing circular holes in wood or metal.

Boring Bar—A stiff cylindrical bar provided with a cutter head; used on lathes, drill presses, and other machines for boring cylinders, etc.

Boring Machine—A machine especially constructed for boring holes in cylinders, bosses, bearings and the like.

Boring Tools—Brace bits and similar tools for wood, and cutters for metals, including a large number of types, for interior cutting.

Boss—The center or hub of a wheel. A raised circular projection or knob.

Boston Hip Roof (Arch.)—Formed by laying a double row of shingles or slate lengthwise along the hip of a roof. Joints must be securely made to secure a water-tight job.

Boundary—A limiting or dividing line, or mark.

Box Column (Arch.)—A built up hollow column, generally of square section, used generally in porch construction.

Box Wood—A hard, tough, close grained wood of a pale yellow color. Used for rules, scales, and small tools and tool handles. Before being used it should undergo several years of seasoning.

Brace Bits—The ordinary bits used for wood boring and having square tapered shanks to fit in the socket of a common brace.

Bracing (Arch.)—The staying or supporting with rods and ties, for the strengthening of a structure.

Brass—An alloy of copper and zinc; or copper, zinc, and lead.

Brazed Joints—Joints made by brazing; as distinguished from soldered, welded, riveted, or screwed joints.

Breast Drill—A device similar to a brace. Pressure applied by leaning against it with the upper part of the body.

Brick Pier (Arch.)—A plain detached mass of masonry serving as a support.

Brick Veneer (Arch.)—A facing of brick, applied usually to a frame structure.

Bridging (Arch.)—A method of bracing joists or studding, by the use of short diagonal strips or braces.

Briquettes—Compressed fuel, composed of coal dust and a binder.

Buff—An appliance for polishing and finishing metallic surfaces. Generally consists of a large number of muslin discs fastened together to form a polishing wheel.

Building Paper—Heavy paper used between sheathing and siding or as an under covering on roofs, as additional protection against weather.

Burnish—To polish a metallic surface by the friction of another metallic surface brought in contact with it.

Buttress Thread—A screw thread whose section is triangular, but which has one face at right angles to the axis of the screw, the second face only being sloped. Used in cases where excessive shock must be absorbed, as in breech blocks of cannon.

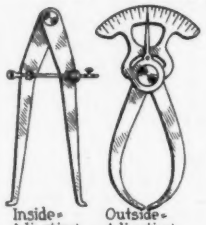
Butts—Hinges.

C

Caisson—A water-tight casing sunk into the bed of a stream or other body of water to be used in the construction of the foundation of bridges and structures under the water. The work of excavation is carried on within it.

Calibration—Ascertaining the amount of variation from absolute accuracy in a scientific instrument.

Calcimine—A wash made of whiting and glue mixed with water. It is often tinted for use on walls.



Calipers

Caliper—An instrument used for measuring the inside or outside diameter of circular work.

Calorimeter—A device for measuring quantity or amount of heat.

Cam—A device, usually plate or cylinder, which transmits variable reciprocal motion to a piece of mechanism by means of a follower.

Camber—(arch.)—The amount of upward curve given to an arched bar, beam, or girder.

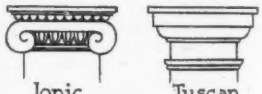
Cant—A slope or angle.

Cantilever—(arch.)—A beam fixed at one end and loaded at the other, or loaded uniformly.

Cap—(mech.)—The upper or loose portion of a shaft bearing attached to the lower portion by screws or bolts.

Cap Stone—(arch.)—Stone used for the top or crowning of a structure.

Capital—(arch.)—The upper member of a pier, pilaster, or column.



Capitals

Carborundum—An abrasive material of carbon and silicon, whose hardness is second only to the diamond.

Carpentry—The work or trade of a carpenter.

Carpet Strip—(arch.)—The piece of wood fastened to the floor under a door.

Case Hardened—The process by which a hard, thin film is formed on the surface of wrought iron.

(To Be Continued)

ANNOUNCE CONTEST WINNERS

Alvan T. Simonds, president of the Simonds Saw & Steel Company of Fitchburg, Mass., has for the past three years offered rewards to students for writing essays on economic subjects. Cash awards amounting to $1,500 have been made each year. These educational contests have been conducted and provided for by Mr. Simonds personally, with the object of promoting the study of economics generally in the high schools and normal schools of the United States and Canada.

"Sharing Our National Income" was the topic for discussion in the 1924 contest, and the following winners have been announced:

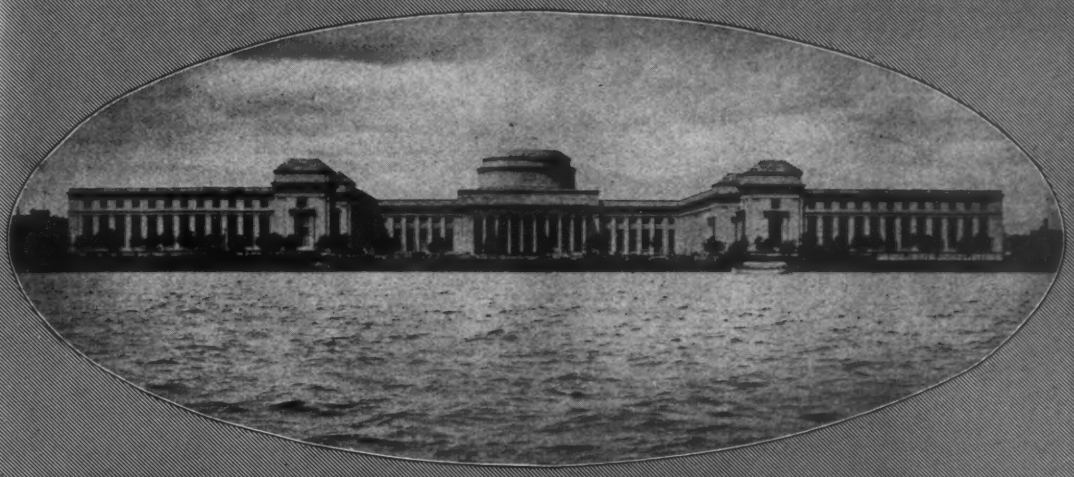
First Prize, $500.00; Aaron Scherwin, Brooklyn, N. Y.

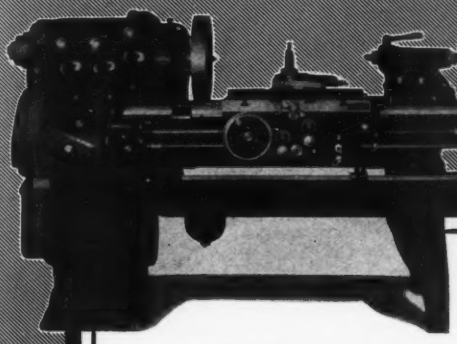
Second prize, $300.00; Benjamin Grossman, Brooklyn, N. Y.

Third prizes, $100.00 each; Max Bernstein, Brooklyn, N. Y. Sidney Dressler, Brooklyn, N. Y. Reinhold Dreher, Brooklyn, N. Y. Arthur F. Anderson, Brooklyn, N. Y. Angela Furia, Philadelphia, Pa. Dallas W. Smyth, Pasadena, Calif. Marshall Spaulding, Pasadena, Calif.

The judges of the 1924 contest were Dr. Albert Shaw, New York City; George W. Coleman, Dean of Babson Institute, Wellesley Hills, Mass.; and John G. Thompson, Fitchburg, Mass.

The Alvan T. Simonds Prize Contest for 1925 has for its subject "Your Prosperity and Mine." For further information write the Contest Editor, 470 Main Street, Fitchburg, Mass.





and now—

The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

as a part of their Metal Working Equipment.

The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

THE MONARCH MACHINE TOOL COMPANY, 404 OAK STREET, SIDNEY, OHIO.

What is the "Web" of a twist drill?

And the "Heel" — the "Lips" — the "Body" — and just where is the "Point"? Do you know just what "Lip Clearance" means?

The "HANDBOOK FOR DRILLERS" answers every question the student of modern drilling practice must know. It tells him not only the "How" but—what is more important the "Why" of the different parts of the twist drill.

Because this booklet is both theoretical and intensely practical, it is being used by hundreds of Vocational, Technical and High Schools throughout the world as the standard textbook on drilling practice.

The "HANDBOOK" is issued by this Company, not to promote the sale of its products, but to educate prospective, and not a few **experienced,** drill users to a better and more intelligent understanding of the twist drill and its use.

Instructors are cordially invited to ask for copies of the "HANDBOOK FOR DRILLERS" in any reasonable quantities, free of charge, for the use of their students.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK·CHICAGO·LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

NEWS AND NOTES

Portland Apprentice School. The first group of 64 apprentices was graduated from the Portland (Ore.) apprentice school on May 22nd, at a meeting participated in by official representatives of the Association of Building Construction, the Portland school board, Supt. Grout, and representatives of the state board for vocational education. There was a fine display of the work being done, which was viewed by a large number of visitors. At a formal session, embossed buttons were presented to a number of newly honored guildsmen by Hon. S. A. Kozer, representing the state board.

Shop Work to be Extended in 1926. Funds for extending shopwork instruction in the New York City elementary schools have been granted to George J. Loewy, director of vocational activities, by M. Samuel Stern, acting chairman of the board of education budget committee. The appropriation amounts to $988,212, as against an appropriation of $940,954 this year. It will provide for the establishment of twenty new teaching positions.

Continuation Teachers Seek Higher Salary. Continuation school teachers of New York City have filed a request with the board of superintendents to be paid commensurate with the work done and at the rates paid in other communities. At present there is no salary schedule for continuation teachers continuing to receive compensation for the position from which they were transferred.

Reduce Trade School Term. The board of superintendents of New York City has adopted resolutions restoring to teachers of trade subjects in vocational schools, the month of July as a vacation period. Up to this year, teachers of these subjects have remained on duty throughout the month of July, while all other teachers, including those of academic subjects in vocational schools, were off duty.

Exhibit of Manual Arts. An exhibit of manual arts was held June 11th and 12th at the Alleghany County High School, Cumberland, Md., in conjunction with the exhibits of cooking and sewing departments. The wood working display included a French gray breakfast table, taborets, flower stands, book-racks, plate-racks, umbrella stands, floor lamps, table lamps and foot stools. Nearly two hundred articles were displayed in an attractive manner.

The department has also performed the repair work in the building and has built scenery for plays given by the dramatic clubs.

The drawing exhibit consisted of freehand sketches, geometrical constructions, projections, machine drawings, architectural drawings and tracings. A complete blue printing outfit was also displayed. The printing section had displayed such articles as tickets, programs, stationary and standard forms used in the school.

Junior High Aids Boy in Industrial Arts. The industrial arts work offered in the Harper junior high school, Chicago, which gives a clue to the new work to be offered, aims to give knowledge and skill that will function as prevocational training. However, a boy after having tried out these courses, finds he is unsuited to them, may try something else and the knowledge gained will be of value to him in later life. The tryout courses are intended to serve the purpose of vocational guidance. It has been said that a large per cent of people in the various trades and professions are misfits.

In the tryout courses, a boy has an opportunity to try four shops and to study mechanical drawing. They spend ten weeks in each of the following: wood shop, electrical shop, print shop, and sheet metal shop. In the seventh grade they try these four shops by rotating every ten weeks from one to the other. At the beginning of the eighth grade, they may select the one in which they will specialize.

It is aimed to give the pupils a varied set of experiences so that they may better know human nature in general and human work, honest work, and therefore be better fitted to sympathize with the difficulties and rewards of fields in which they may never work.

In the tryout electrical course the pupils become familiar with the tools and vocabulary of the electrician. They acquire the necessary information regarding the actual conditions in the trade, its entrance requirements, future possibilities, hours of labor, wages, apprenticeship period, and working conditions in general. There are six model rooms in which problems such as house wiring and installation of bell circuits are made. The boy gains a working knowledge of electricity such as he is most likely to apply in everyday life—repairing a bell, repairing a heating appliance, and replacing a fuse.

(Continued on Page 22a)

Don't they deserve good tools?

COME to think of it, a boy is as likely to prize good tools as a man. He enjoys his training more, and gets more out of it, when he learns to work with tools as accurate and sturdy and well finished as those his elders use.

Mechanics—professional and amateur—have favored Millers Falls tools for two generations and more. It is only fair to the youngsters to train them on the kind of tools they will pick out for themselves when they grow up.

The new Millers Falls Catalog, No. 39, is yours for the asking—or write for special folders describing tools for vocational training.

MILLERS FALLS COMPANY
MILLERS FALLS, MASS.

28 Warren Street
New York

9 S. Clinton Street
Chicago

MILLERS FALLS TOOLS
SINCE 1868

"Truth"

in

Furniture Advertising

As Revealed by 1532 Advertisements

THANKS to the efforts of the various furniture associations the "truth in furniture descriptions" movement is making marked progress.

This in itself insures the far-seeing manufacturer and dealer an extra profit in cash and good will on *"real walnut"* furniture.

Standards in furniture advertising have been improved. The furniture industry today frowns on many practices formerly used.

In a recent survey of retail furniture advertising 1532 advertisements from all over the country were analyzed. They showed that 97% of the advertisements "featured" walnut furniture. Here is a further analysis showing how retail furniture dealers are living up to the best advertising standards of the trade:

18% of the advertisements described wood furniture fully and accurately.

31% of the advertisements used such terms as "Combination Walnut," "Walnut Finish," etc., in describing furniture. (A step in the right direction—clear to the trade, but not to the public.)

51% of the advertisements described as "Walnut" furniture that was mostly or wholly of other woods. (This does not promote public confidence.)

These statistics, drawn from advertisements in large and small cities representing furniture stores of all degrees, are illuminating. They show the tremendous vogue for walnut and its practically universal demand. The difference in cost of producing all walnut exterior is slight. On a major piece, in this class of furniture, it would probably be less than $5.

Even at the slightest increased cost this would still be the easiest merchandise to sell because it could then be advertised and sold as *genuine walnut*. Send for the complete report.

18%
of retailers advertisements described their wood furniture fully and accurately
31%
of advertisements used such terms as Combination Walnut, Walnut Finish, etc in describing furniture
51%
of furniture advertised was incorrectly designated as Walnut

AMERICAN WALNUT

AMERICAN WALNUT MANUFACTURERS' ASSOCIATION

Room 1229, 616 South Michigan Avenue

Chicago, Illinois

(Continued from Page 20a)

In the eighth grade, electricity may be elected for the entire year. This marks the beginning of specialization in the chosen field. The pupils are older and capable of performing more difficult problems. They make a study of the theory of the subject. Such problems as a small electric stove, a toaster, a buzzer, an electric soldering iron, and a transformer are made.

In the ninth grade, electricity may be elected. This marks the end of the junior high school training. From this grade they are capable of entering the field of electricity or continuing their study in the senior high school. By the end of the ninth grade, a boy acquires enough knowledge to enable him to repair a small motor on an electric fan, or washing machine, to install a lighting system, bell system, etc.

Trade Teachers' Tests. Ninety-nine candidates took the written examinations for license to teach trade subjects in evening high and trade schools given by the board of examiners of New York City, making a total of 251 candidates examined in 21 different trade subjects during the past two days. Among the subjects represented in the examination were carpentry and joinery, plumbing, printing, telephony, photography, upholstery, shoe stitching, painting and decorating, pile fabrics, sign writing, and trade millinery.

New Art Curriculum. An art curriculum for elementary schools of Baltimore, Md., is in process of preparation. The course outlined takes the form of a series of projects, involving the problem, using the courses of study in history, geography, English and other subjects, now in use in the schools as a background of related information. The content material relates closely to the industries most useful to man, the products of which are grouped under the heading of food, shelter, clothing, utensils, tools, machines, power and records. The topics based in each grade on a definite historic period, constitute a concise survey of art, evolved by the human race in providing itself with shelter, food, clothing, utensils, tools, machines, and power, in transmitting ideals, and in making records of accomplishments. A large fund of industrial information will also be provided, with emphasis on the art side of the projects rather than on the related subject-matter. Wide scope for handwork has been provided for, with suggestions of appropriate problems, together with the necessary general directions for solving them. Handwork including drawing and construction, will be undertaken as a means of attaining insight through participation, and expression through manipulation. Handwork is to be considered as a means and not an end. The major aim of the art instruction is to be directed toward training in taste, cultivation of artistic judgment, and development of the capacity to enjoy the beauty of products of fine quality and design. This is summed up under the familiar term appreciation, which implies the ability to evaluate correctly.

The accompanying diagram shows the organization of the subject:

School for Apprentices. An apprentice commission of twelve members of unions and employers in the building trades has been formed at Spokane, Wash., to prepare a comprehensive apprentice program for these trades. The local school board has agreed to cooperate with the commission, and to work toward the education of the apprentices in the part-time school to be started in the fall.

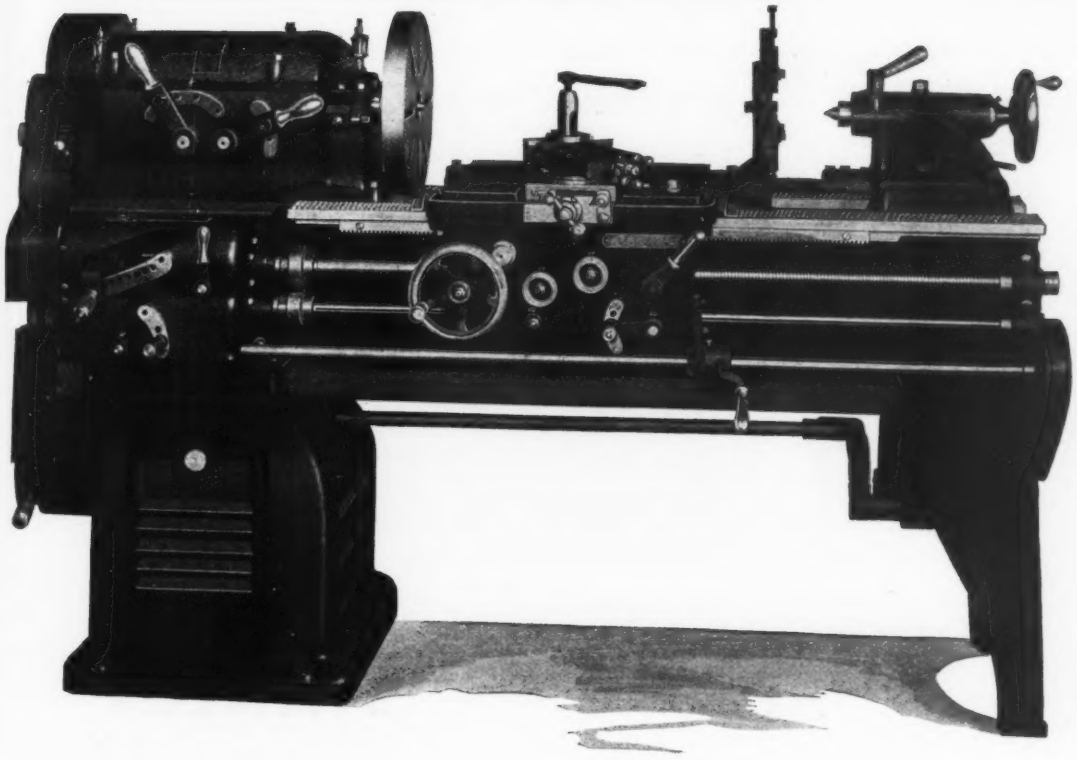
Under the proposed system, the apprentice is to be guaranteed a permanent job, with the opportunity of attending the part-time school four hours a week. The program will be representative of the trades unions, the school board, the building contractors, building material men, the architects and engineers, and will have to do with the age of apprentices, periods of advancement, examination and promotion, course of study, and enforcement of school attendance.

Vocational School Graduates. The first commencement of the Schwab Vocational School at Homestead, Pa., was held May 27th in the Homestead high school, with Dr. G. D. Whitney as the principal speaker. Nine students of the school were awarded diplomas at the exercises.

Vocational Guidance Bureau. A vocational guidance and junior placement bureau is to be established by the Essex County (New Jersey) board of education. A supervisor is to be appointed, to have charge of the new bureau at its opening in September.

Printing Course. Printing has been added to the high school course at Troy, N. Y. A job press and other equipment has been purchased and will be installed in time for the opening term.

(Continued on Page 24a)



Built for the School Room

A Motor Driven Lathe no higher than a cone-head machine and with no overhead mechanism to obstruct the view of either pupil or instructor

The New Sidney, 14" x 6', Standard Pattern, Eight-Speed, ball bearing geared head lathe specially designed for the Manual Training Schools of Boston, Mass.

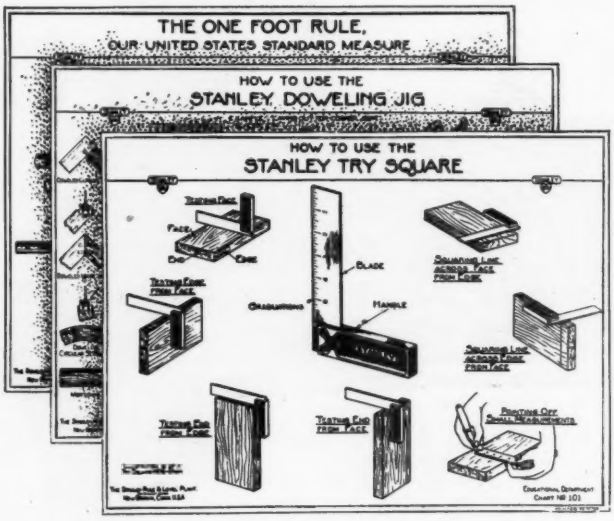
SIDNEY

This Trade Mark stands for the latest and best in Manual Training School Equipment.

This lathe has several new safety features which particularly adapt it for use in School Rooms. Motor is wholly enclosed in cabinet leg with belt power to headstock, and a ball bearing belt tightener. Is equipped with a Cutler-Hammer reversing switch operated from apron. Also has special safety shearing pins on lead screw and feed rod.

Write today for complete data and specifications of this and other Sidney-Built machines designed especially for the promotion of the Industrial Arts in Modern School Work. Address Dept. 407.

The Sidney Machine Tool Co.,
Sidney, Ohio.



FREE
a new chart
on the
STANLEY
Try Square

Measures 17 x 12⅜ inches. Very helpful in classroom work. Can be framed under glass if desired. Copies will be gladly supplied without charge.

Note:—There are two more in this series—Chart No. 102 on the Stanley Doweling Jig and Chart No. 100 on Stanley Rules.

STANLEY SW

STANLEY
NEW BRITAIN, CONN., U.S.A.
THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

(Continued from Page 22a)

Urge Extension of Trade Courses. Extension of trade, vocational and practical arts courses for girls has been recommended to the board of superintendents of the New York City branch by the National Council of Administrative Women.

Summer School of Art. A summer school of art with daily sessions, beginning June 15th and lasting for two months, has been opened at Richmond, Va. The classes will be held in the Marshall high school and will be in charge of Mr. F. G. Spear, head of the art department of the school. Color design, illustration, modeling, interior decoration, pottery design, and stage design are among the subjects to be taught.

Upholstery Course. Upholstering is one of the courses added to those taught at the Peckham Vocational School, Buffalo, New York. This will be a two-year course for boy graduates of the eighth grades of the public and parochial schools. Peckham is one of four vocational schools in which training is offered to boys intending to learn a trade.

Vocational Class. A vocational class in jewelry and design has been established at the Rhode Island School of Design through the cooperation of the manufacturing jewelers and the school of design. Under the plan, the manufacturing jewelers furnish the student classes, the school provides the facilities, and the state vocational board pays for the instruction. The students attend school for a certain period and then work in shops, alternating with another class in receiving instruction.

New Vocational Departments. The new John F. Hughes School at South Utica, N. Y., to be opened in September, will have 32 classrooms, in addition to manual and electrical training departments, domestic and sewing classes, dining room, library and clinic. The building accommodates 1,320 students and was erected at a cost of $665,000.

Train Trade Teachers. With the expectation of a large increase in the enrollment of the vocational evening and trade school at Wilmington, Del., the director, Mr. A. B. Anderson, has organized a teachers' training class. The class is made up of skilled tradesmen, many of whom are foremen in local industries.

Classes for Plasterers. Evening classes for plasterers are held four evenings each week at the Buckman School, Portland, Ore. The first part of each evening is devoted to technical planning and designing. After this, the men go to the basement of the school, which is divided into small rooms for practical work in plastering.

Vocational Site Chosen. A site has been selected for the new vocational school to be erected at Dallas, Tex., at a cost of $500,000.

Open Third Vocational School. The third vocational day school has been opened this year at the Dickinson junior high school, Chattanooga, Tenn. Prof. C. A. Anderson will be in charge of the school.

Trade Apprentices Awarded Honors. Guild buttons and diplomas were awarded to student-tradesmen for proficiency in workmanship and school studies, at a recent meeting held at the vocational trades school, Portland, Oregon.

Diplomas for Foremanship Class. Thirty-seven men from various shops and factories of Grand Rapids, Mich., received diplomas on their qualifications for foremanship at the graduating exercises of the vocational and technical high school held on June 5th. The graduates had completed two-year courses in foremanship.

Three-Million-Dollar School. The new $3,000,000 manual training school, to be erected this year at Washington, D. C., will be one of the finest of its kind in the country.

Vocational Conference. Vocational directors of national prominence were in attendance at the eighth annual conference of state supervisors, directors, and federal educators held at Spokane, Wash.

Talks on Vocations. Practical talks on the vocations are given to high school boys of Allegan, Mich., by members of the local rotary club. Business and professional men meet groups of boys once a week, and discuss the problems peculiar to each vocation. Similar instruction is given to girls of the high school by members of the women's business and professional club.

Educational Conference. The Education Department of the American Type Founders Company, Jersey City, N. J., held an educational conference and luncheon at the

(Concluded on Page 26a)

Mobilizing an Army of all Types

THE-BOY-AT-THE-STONE with his army of all types (cast in the American mold) is preparing to storm the citadel of illiteracy and ignorance. The ammunition of this army of types consists of books, spelling lists, school papers, scientific notes, etc.—in fact, printed material that will be of interest and value to all readers. The-boy-at-the-stone has a wonderful opportunity. It is necessary, in order to prepare his types for the printing press, that he be a logical thinker, be possessed of skilled fingers, and have an inborn sense of orderly arrangement. Punctuation, capitalization, spelling, division of words, paragraphing, in fact all the rudiments of English construction, are necessary to perfect typesetting; but the-boy-at-the-stone, in addition to this knowledge, is taught manipulative skill, accuracy, and artistic arrangement.

Every technical operation in printing possesses educational value, as it motivates the academic instruction. Abstract studies are made interesting. The printed product has a community as well as a commercial value; and this appeals to the youthful mind because it is being permitted to do that work which is to be judged by others.

There is a printing outfit for every type of school. The cost of the printing equipment may be made to conform to almost any amount. Write to-day for information regarding the type of school in which you are considering the installation of printing. Should you desire a representative to call upon you, the matter may be arranged to suit your convenience. Write now.

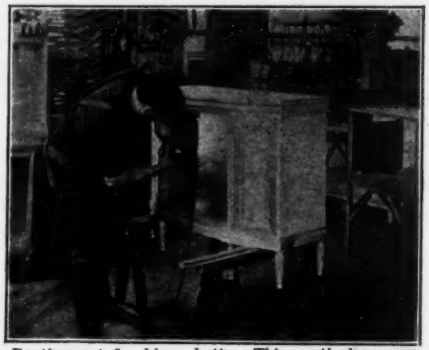
F. K. PHILLIPS, *Manager*, EDUCATION DEPARTMENT

American Type Founders Company

300 COMMUNIPAW AVENUE

Jersey City, New Jersey

A CORPS OF TRAINED EDUCATORS, ENGINEERS AND SALESMEN AT YOUR SERVICE

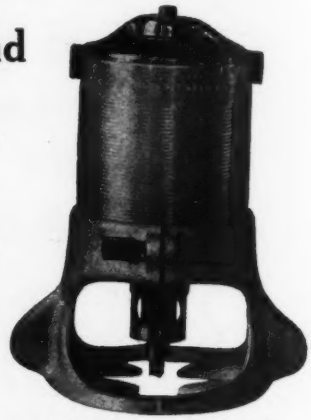


Routing out for hinge butts. This particular manufacturer says: "Your machine, which cost me $42, has saved me $700."

Routing for two-tone work on a curved chair back—the Carter Router is used here with veining guide.

The Carter Electric Router

Beads, Routs and Flutes Quickly and Perfectly



Weighs four lbs.; 6 in. high, 4 in. in diameter; ¼ H. P. Universal motor operates from regular lighting circuit (state your voltage). Price $44, includes $2 worth of bits, combined switch and connector, templet guide, cord and plug. Beading and fluting attachment $15.

It fits the hand and does the work of many hands—better, quicker, easier and at less cost. Does perfect lining, inlay and two-tone work, even on curved surfaces such as dresser fronts, etc. A special attachment instantly converts it into a most efficient beader and fluter. Two complete machines in one! It beads and flutes in small irregular places inaccessible to the cutter on a large shaper. Work may be done anywhere in the shop where there is a lamp socket.

"Our Circular Will Interest You!"

THE R. L. CARTER CO., Inc.

1238 Chestnut St., Phoenix, N. Y.

(Concluded from Page 24a)

offices of the firm on June 13th. The program opened with an inspection of the type foundry and a study of the processes of typemaking, followed by a luncheon in the beautiful new dining room of the institution. After luncheon, talks were given by Mr. W. A. O'Leary, assistant commissioner of education of New Jersey, and by Mr. Arthur Dean. A general conference followed.

New Vocational School. Huntington Township, near Norristown, Pa., has established a vocational school, to cost $39,000.

Best Tech Schools Named. Names of fourteen technology schools, colleges and universities in the United States offering the best courses in chemical engineering were presented at the summer meeting of the American Institute of Chemical Engineers. The list is the result of a three-year study by a committee of which Dr. H. C. Parmelee of New York is the chairman.

New Vocational High School. Plans have been considered for a new vocational high school in Toledo, O. It is planned to establish a high school where vocational training and academic work in allied subjects may be combined.

Dallas Vocational School. A site has been purchased at Dallas, Tex., for the first of a group of vocational buildings to cost $500,000. It is planned to give instruction in a number of trades, including the graphic arts, building and others.

Trade School Offers Study. A new type of training that permits students learning a trade to earn a salary while in school is the Los Angeles Plan of trade apprenticeship inaugurated by W. S. Kienholz, director of vocational education at the Frank Wiggins Trade School. In cooperation with the merchant plumbers' association, the city schools offer two courses in plumbing, one a basic training course for boys in the eleventh year of high school and a cooperative apprentice training course for boys in the twelfth year of high school.

During the latter course, the boy learns by actual work on the job with various plumbing firms, receiving pay of approximately $500 while in training. He also works out practical and theoretical problems in sanitation and engineering in the school.

Organize Industrial Arts Association. Organization of the Western Industrial Arts Association has been effected by delegates to the trades and industries section of the regional and vocational conference held in June at Davenport, Wash. Industrial educators of eleven western states, as well as representatives of the federal board of vocational education, make up the membership of the association.

Course in Auto Mechanics. The course in auto mechanics at the Boise (Ida.) high school will be continued next year on the same basis as last year. Two courses in auto mechanics are offered in the high school industrial arts building. The first course is for car owners and the second is concerned with automobile repair.

Art Talks. In order to carry out the ideals of teaching art, the Sabin Junior High School of Chicago, Ill., has offered to its students a series of "art talks." The first of these was a chalk talk dealing with the art of ancient Egypt, prepared by a class in the 8B grade and given to an assembly of one thousand students. The class was divided into groups, a group of ten who spoke, a group of twelve who drew, and those in charge of the blackboard and those who took care of the lantern slides and lights.

Propose Electrical Course. Supt. J. B. Richey of McKeesport, Pa., has recommended the establishment of an electrical course in the high school. Forty boys have signified a desire to take the course when it is offered.

Salaries Paid to Plumbing Instructors. The apprenticeship service department of the National Trade Extension Bureau has completed a study of plumbing covering every known school of plumbing in the country. The study covered kind of instruction, salary schedules, journeyman's rate, difficulties in securing instructors, and salary schedules for day and part-time plumbing instructors. The study revealed that of 71 institutions replying to the questionnaire, 94 instruction units were offered. Three schools offered three types or units of instruction; twelve schools offered both day and evening instruction, while five schools offered both part-time and evening instruction. Four schools offered day instruction only, six part-time instruction and 41 evening instruction only.

New Jersey Educators Entertained. The American Type Founders Co. of Jersey City, N. J., entertained the educators of the state engaged in the field of industrial education at a luncheon given on Saturday, June 13th. Approximately 85 persons were present to accept the invitation of the firm. Before and after the luncheon the visitors were invited to inspect an exhibit of treasures of the typographic library, the work of printing craftsmen from the time of Gutenberg until today. Addresses were given by Mr. Arthur Dean of the University of California; Mr. Henry L. Bullen, of the Typographic Library and Museum, and by Mr. W. A. O'Leary of the New Jersey Educational Department. Mr. Frank Phillips acted as toastmaster at the luncheon.

Complete Five-Year Study. The State Education Department of Illinois has completed a five-year study of salaries for home making teachers from 1920 to 1925. The total frequency ranged from 93 in 1920 to 154 in 1925. The average salary ranged from $1,486 in 1920 to $1,581 in 1925, while the median ranged from $1,500 in 1920 to $1,550 in 1925, and the mode from $1,400 to $1,600. The lowest salary in 1924-1925 was $1,260, and the highest salary reached was $2,300.

PERSONAL NEWS

Mr. Samuel Insull, public utilities leader of Chicago, Ill., has been elected president of a new organization sponsoring the establishment of a national museum of engineering and industry as an adjunct of the Smithsonian institution. The sum of $1,000,000 has been pledged toward the $10,000,000 fund from which the museum building will be erected in Washington.

Mr. James F. Mason, director of the vocational school at Paterson, N. J., has declined an offer to act in a similar capacity as head of the Essex County Vocational School.

Mr. M. S. Lewis, formerly state director of vocational education for Idaho, has been appointed lecturer of education at the University of California at Berkeley. Mr. Lewis has been connected with the research service center of the division of vocational education of the University since July, 1923.

DEVOE ENAMELIT

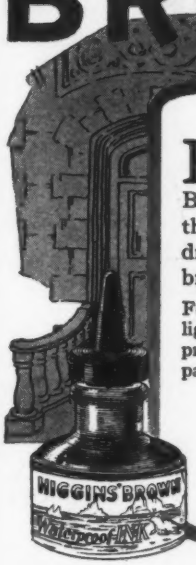
This art enamel paint is a perfect finish for decorative and design work on all surfaces other than paper.

Manufactured by

Devoe & Raynolds Co., Inc.
1 West 47th St., New York

Branches in Leading Cities

BROWN



RICH in color, HIGGINS' Waterproof Brown is much favored by the architect, engineer and draughtsman for indicating brownstone, earth, etc.

For line work or thinned for lighter tinted washes, Waterproof Brown cannot be surpassed by any other medium.

Brilliant—Transparent—Permanent.

CHAS. M. HIGGINS & CO.
271 Ninth St., Brooklyn, N. Y.
Chicago *London*

HIGGINS' Drawing Ink

TRADE PUBLICATIONS

Issue Catalog "D" 36th Year. F. A. Rauch & Company of Chicago, Illinois, have issued a carefully compiled and completely illustrated catalog of upholstery materials, containing trade information of interest and value to shop teachers.

Among the articles described in the book are upholstery tools, cabinet and drapery hardware, upholstery fabrics and bedding supplies, auto top materials, colonial and periodical furniture trimmings, screen parts, hinges and butts, cabinet locks, hammers, shears, polychromed mirrors, vacuum cleaners, etc.

F. A. Rauch & Company, after 36 years of service are well equipped to serve shop teachers who are in need of any special materials for cabinet making, upholstery, etc. The catalog will be sent free on request.

Thirty-sixth Edition of General Catalog. The Keuffel & Esser Company of New York, have just completed the thirty-sixth edition of their general catalog, a beautifully bound book, which supersedes all previous editions. The book contains 482 pages of helpful suggestions, including descriptions and illustrations of the K. & E. products. Among the various articles listed in the book are the following: Drawing papers, tracing cloth, blue print papers, "Standard" cross section papers and cloth, "Standard" blanks for the building trade (record and expense sheets, certificate books, etc.), engineers' field books, drawing instruments, (drawing pens, compasses, pantographs, section liners, protractors, etc.), map measures, folding pocket rules, triangles, curves, T-squares, drawing tables and folding trestles with drawing boards, water colors, inks, brushes, china and glassware, pencils and erasers, calculators, slide rules, planimeters, mechanical integrators, surveying instruments, architects' and engineers' levels, mining compass and clinometer, mining lamp and plummet, surveying and geologists' compasses, pocket transits, barometers, anemometers, rain gauges, current meters, leveling rods, plumb bobs, prism binoculars, spyglasses, measuring tapes and chains, etc. Prices are not included in the general catalog, but separate price lists are published from time to time and will be sent on request.

Cleveland Twist Drill Co. Issues New Catalog. Catalog No. 41, issued by the Cleveland Twist Drill Company of Cleveland, Ohio, is just off the press. It is a smaller and more convenient booklet, more comprehensive in form than any previous catalog. It is a ready guide to the tools themselves and also a valuable aid to their most economical use. Catalog No. 41 illustrates and describes all the regular "Cleveland" tools and a few special tools.

The Cleveland Twist Drill Company are manufacturers of drills, reamers, screw extractors, arbors, mandrels, sockets, mills, and counterbores. A complete list of specifications accompanies all the tools listed and illustrated.

An interesting feature of the catalog is the section on mechanical data, which contains drilling helps and hints, together with valuable sketches and tables of speeds, dimensions, etc. Another interesting section is the "private code" which is a very helpful and valuable service to the schools as well as the trade.

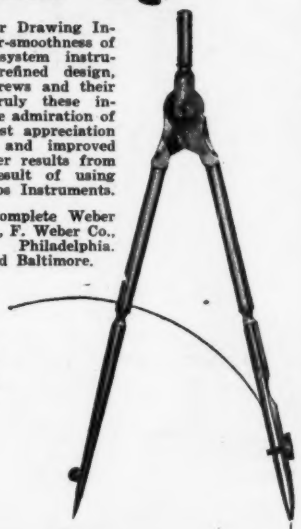
A copy of Catalog No. 41 will be sent free on request.

NEW JOHNSON No. 20 METAL MELTING POT.

Pick one Up

Pick up a Weber-Riefler Drawing Instrument. Feel the super-smoothness of these original round system instruments. Notice their refined design, their absence of set screws and their marvelous balance. Truly these instruments will arouse the admiration of anyone with the slightest appreciation for fine workmanship and improved design. You sense better results from your pupils as the result of using Weber Sphinx or Cosmos Instruments.

Write for catalog of complete Weber line. Address Dept. I.A., F. Weber Co., 1220 Buttonwood St., Philadelphia. Branches: St. Louis and Baltimore.



Sets of Weber Sphinx or Cosmos Drawing Instruments are for sale in a wide range of sizes and prices.

WEBER

Drawing Instruments & Materials

The Pen-ultimate In Drawing Instruments

GOLD MEDAL CRAYONS · FOR EVERY USE ·

The Teaching of Industrial Arts

is becoming a matter of Art Relationships. All of the school subjects are inter-related in today's ideals of education.

There is a GOLD MEDAL product for use in every educational project. The qualities of responsiveness, color - brilliancy and smoothness await your choice to carry on the important work of the educative arts.

CRAYOLA *Wax Crayons*
PERMA *Pressed Crayons*
ARTISTA *Water Colors*
Blackboard Crayons
and Colored Chalks.

We shall be pleased to send you samples.

BINNEY & SMITH CO.
41 East 42nd St. NEW YORK, N.Y.

Makers of the best-known Crayons in the world

TRADE PRODUCTS

New Melting Furnace. The Johnson Gas Appliance Company of Cedar Rapids, Iowa, has added to their line of gas appliances a new No. 20 Melting Furnace, which has a capacity of 50 lbs. of lead. It is heavily constructed and designed to give the most economical and efficient service, and does not require the use of a forced air blast or blower. The No. 20 Melting Furnace is ideal for school purposes.

The Johnson Gas Appliance Company has also put on the market a No. 400 Melting Furnace, which has a capacity of 600 lbs. of lead.

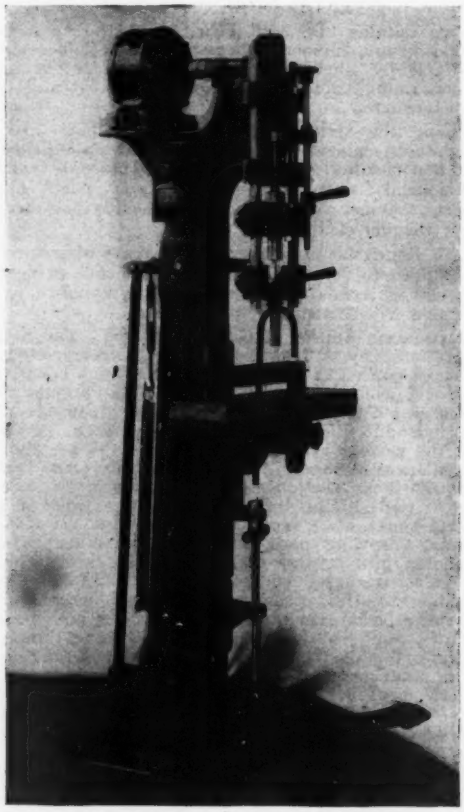
New Chisel Mortiser. The American Saw Mill Machinery Company has just put on the market a new No. 885 Vertical Hollow Chisel Mortiser. It is compact, rigid, and designed to operate easily and to give maximum production with ½" or smaller chisels and ¾" or smaller boring bits, and will perform these operations in hard, dry wood. The spindle is driven by a ½ h. p. electric motor. For belt drive a pulley is furnished instead of the motor. The frame is cast in one piece and is provided with a base of ample dimensions to insure a firm support. The machine is seventy inches high and occupies a floor space 20" x 40". Complete information and prices are available from the American Saw Mill Machinery Co., Hackettstown, N. J.

The San Antonio Manufacturers' Association have just conducted a series of industrial intelligence contests, in which hundreds of papers from eighty schools were entered and over $1,000 in prizes awarded. The object of the contest was to arouse an interest among students in local vocations and industries.

An agricultural contest recently held by the A. and M. College of Texas drew 600 contestants from 64 Smith-Hughes high schools. Scholarships, medals, and cups were awarded teams winning in poultry judging, live stock, grain judging, and in the competitions in budding, grafting and the making of farm implements as shop projects.

Weimar, Texas, has voted $100,000 for additional high school building and equipment. Provision is being made for home economics and commercial work.

A new rural high school is being constructed at Maverick, Texas, in which equipment is being provided for home economics, vocational agriculture and shop work.



No. 885 VERTICAL HOLLOW-CHISEL MORTISER, MANUFACTURED BY THE AMERICAN SAW MILL MACHINERY CO.